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March 30, 1995

RECEIVED
MAR 31 1995
OFFICE OF RCRA
WASTE MANAGEMENT DIVISION
EPA, REGION V

Mr. Kevin Pierard, Chief
U.S. EPA, Region V
Ohio-Minnesota Technical Enforcement Section
Hazardous Waste Enforcement Branch, 5HS-12
77 West Jackson Boulevard
Chicago, Illinois 60604

Dear Mr. Pierard:

Please find enclosed the final CME for American Steel Foundries. This document, submitted in partial fulfillment of the 1995 RCRA grant commitment for second quarter, is based on a site inspection conducted on March 21, 1995. This document was prepared by Eric Adams, Division of Drinking and Ground Waters, Northeast District Office of the Ohio EPA, with the assistance of John Palmer of the Division of Hazardous Waste Management, Northeast District Office.

If you have any questions, please contact me at (614) 644-2905.

Sincerely,

Thomas Allen, Assistant Chief
Division of Drinking and Ground Waters

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COVER.CME

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COMPREHENSIVE GROUND WATER MONITORING

EVALUATION

OF

AMERICAN STEEL FOUNDRIES

MAHONING COUNTY, OHIO

OHD017497587

OHIO ENVIRONMENTAL PROTECTION AGENCY

MARCH 29, 1995

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I. GENERAL INFORMATION

Purpose

This report documents the results of a Comprehensive Ground Water Monitoring Evaluation (CME) conducted at the American Steel Foundries disposal facility located in Mahoning County, Ohio. The objective of a CME is to determine whether the owner/operator has, in-place, a ground water monitoring program that is adequately designed, operated and maintained to detect releases or to define the rate and extent of contaminant migration from a regulated unit as required by Rules 3745-65-90 through 3745-65-94 and 3745-65-75(F) of the Ohio Administrative Code. The period of compliance under evaluation for the CME is from October 25, 1990 to March 21, 1995.

Information Sources

This report is based on an extensive record review and a site inspection conducted at the facility on March 21,1995. The purpose of the inspection was to determine the adequacy of the ground water sampling procedures, ground water surface evaluations, verify the number and locations of monitoring wells, perform a surficial monitoring well construction and integrity inspection and review written records pertaining to the ground water monitoring program. The site inspection was conducted by Eric R. Adams, Author, Division of Drinking and Ground Waters, Northeast District Office, Ohio EPA. Also present at the inspection were John Palmer, Division of Hazardous Waste Management, Northeast District Office, Ohio EPA, Bernadette M. Wellman, Manager of Environmental Affairs, American Steel Foundries, Terry Bradway, Environmental Manager, American Steel Foundries, Jameel Ahmed, Associate Geologist, Roy F. Weston, Inc., Kevin R. Kumrow, Assistant Engineer, Roy F. Weston, Inc. and Brian Sedgewick, Roy F. Weston, Inc.

In addition to information acquired during the site inspection and review of correspondence contained in Ohio EPA files, the following documents provided information upon which this CME report is based:

1. Bowser-Morner Consultants, Environmental Assessment of the American Steel Foundries Lake Park Drive Disposal Site, Alliance, Ohio, 1986.

2. Crowell, Katie Shafer, Ground Water Resources of Mahoning County, Ohio Department of Natural Resources, 1979.

3. Cummins, James W., Underground Water Resources, Mahoning River Basin (Upper Portion), Ohio Department of Natural Resources, 1960.

4. Ohio EPA, Comprehensive Ground Water Monitoring Evaluation of American Steel Foundries, June 1988.

5. Ohio EPA, Comprehensive Ground Water Monitoring Evaluation of American Steel Foundries, December 1990.

6. Residuals Management Technology, Inc., Ground Water Sampling and Analysis Plan, March 1992a.

7. Residuals Management Technology, Inc., Ground Water Quality Assessment Plan, March 1992b.

8. Residuals Management Technology, Inc., Ground Water Quality Assessment, December 1994a.

9. Residuals Management Technology, Inc., Landfill Closure and Post-Closure Plan, December 1994b.

10. Sedam, Alan C., The Hydrogeology of the Pottsville Formation in Northeastern Ohio, U.S.G.S. Hydrologic Investigations Atlas HA-494, 1973.

11. Stout, W., Ver Steeg, Karl and Lamb, G.F., Geology of Water in Ohio, Ohio Department of Natural Resources Bulletin No. 44, 1943.

12. U.S. Department of Agriculture, Soil Survey of Mahoning County, Ohio, 1971.

INSPECTION CHECKLISTS

Attached to this document are two checklists from the RCRA Comprehensive Ground Water Monitoring Evaluation Document (Directive 9950.2) and the Interim Status Ground Water Monitoring Program Evaluation Document (SW-954). The checklists completed for this facility are:

Appendix A: Comprehensive Ground Water Monitoring Evaluation Worksheet

Appendix A-1: Facility Inspection Form for Compliance with Interim Status Standards Covering Ground Water Monitoring

II. FACILITY HISTORY AND OPERATIONS

Facility Name American Steel Foundries

U.S. EPA Identification Number OHD 017 497 587

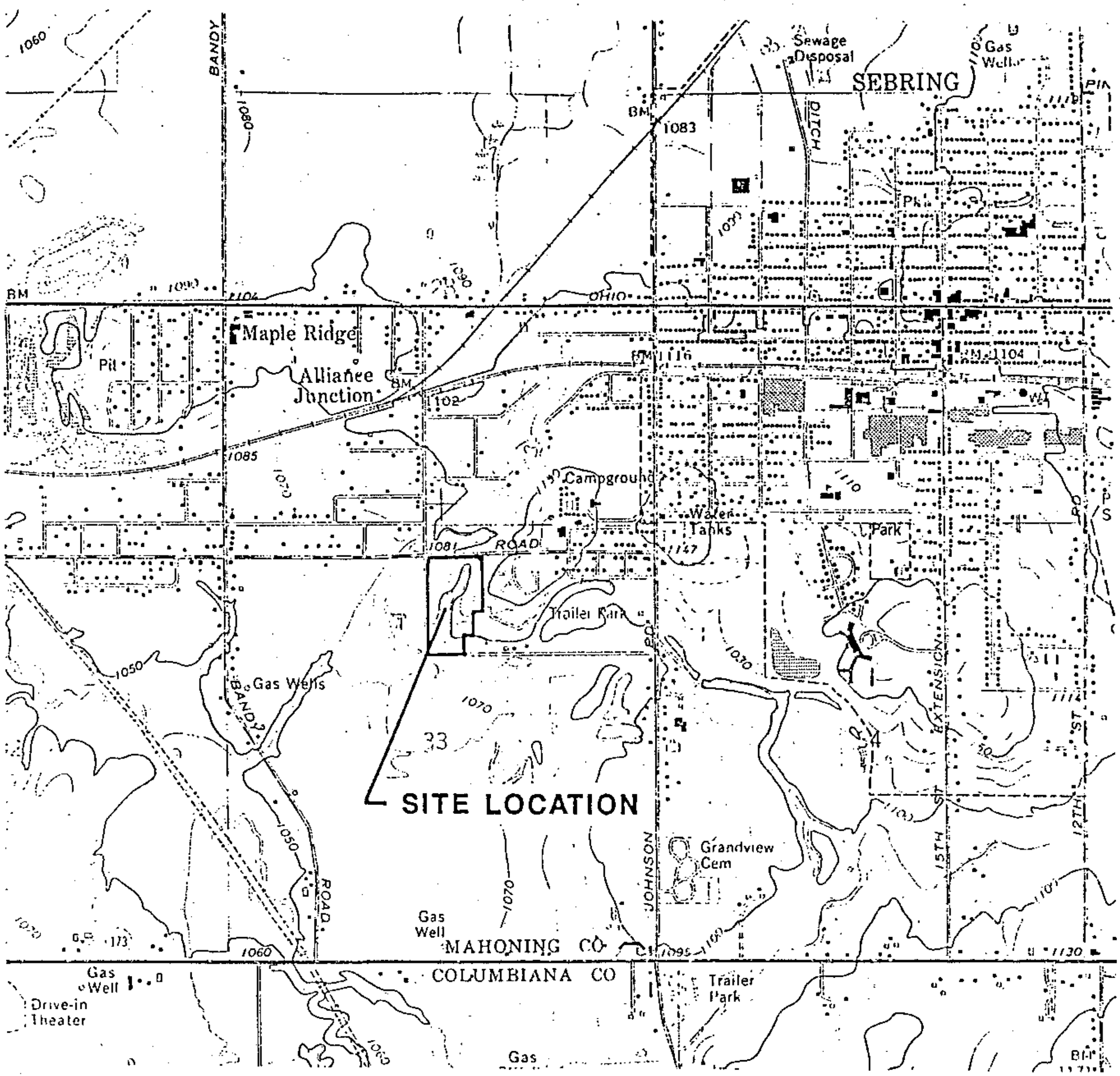
Facility Location

The American Steel Foundries disposal facility is a part of the north half of Section 33, T18N, R5W, Smith Township, Mahoning County, State of Ohio near the cities of Alliance and Sebring. The facility is bordered to the north by Lake Park Boulevard, to the east by the Tecumseh Village Mobile Home Park, to the south by Heacock Road and to the west by Edwinton Avenue. The facility can be located on the USGS Alliance, Ohio 7.5 minute series topographic map at a latitude of 40° 54' 19" north and 81° 2' 30" west (Figure 1).

Facility Description and Operations

The facility is located on an approximately 14.7 acre site. The terrain is uneven and is dominated by a partially filled, swampy strip mine pit which covers approximately eight acres. A strip mining high wall is located immediately east of the facility.

FIGURE 1



STATE LOCATION

0 2000 4000

SCALE: 1" = 2000'

SOURCE:

BASEMAP FROM A USGS 7.5 MINUTE QUADRANGLE MAP, "ALLIANCE", OHIO DATED 1966. (PHOTO REVISED 1971 & 1978)

SITE LOCATION MAP
SEBRING FACILITY
AMERICAN STEEL FOUNDRIES
ALLIANCE, OHIO

RMT INC.

DWN. BY: EAS	
DATE: DECEMBER, 1991	
PROJ.# 2169.02	
FILE #	

FIGURE 1

The facility was used for the strip mining of soft shale coal, and later, clay until these resources ran out. The mining operations produced a large dog-leg strip pit of uncertain depth, which filled with water. American Steel Foundries purchased a portion of the site in 1966. The purchase did not include the southeast portion of the pit's dog-leg. The southeastern portion of the pit is filled with water. It is known as Tecumseh Pond and belongs to the Tecumseh Village Mobile Home Park, Inc.

In 1967, the Ohio Department of Health requested information from American Steel Foundries, as they were aware that American Steel Foundries intended to use the property for the disposal of industrial solid waste. On July 25, 1967, the Ohio Department of Health received a request from American Steel Foundries for a refuse dumping permit. The permit was granted on August 7, 1967. American Steel Foundries was then approved for the operation of an industrial waste disposal site by the Board of Health of the Mahoning County General Health District.

Waste streams approved for disposal at this facility by the Mahoning County General Health District included slag, foundry sand, dirt, silica sand, refractory and other types of brick and sand washer sludge. Throughout the 1970's inspections conducted by the local health department and the Office of Land Pollution Control noted frequent occurrences of open dumping and disposal of unapproved materials. Significantly, American Steel Foundries began during this period to dispose of air emissions control dusts and sludges from an electric arc furnace baghouse at this facility.

On December 17, 1990, all disposal operations at the facility were terminated by American Steel Foundries. Currently, the only activities taking place at the site are related to closure or to ground water monitoring.

Hazardous Waste Generated

Hazardous wastes are not currently generated at this site and do not appear to have been generated in the past. The site was an off-site disposal facility. Hazardous waste may be generated in the future as a result of closure or post-closure activities.

Hazardous Waste Treatment, Storage and Disposal Practices

Wastes generated during various production processes at American Steel Foundries Alliance Foundry were placed into containers or directly into trucks. These wastes were then transported to the disposal facility and dumped into the strip pit. Electric arc furnace baghouse dust which was hazardous for cadmium (D006) and lead (D008) toxicity was managed in this manner. The only treatment of the baghouse dust which took place prior to disposal at the facility was dilution with other waste streams.

All disposal at this facility has ceased, and American Steel Foundries intends to close the unit as a landfill.

Regulatory History

Pursuant to changes in the solid waste laws of Ohio in March 1979, the Ohio Environmental Protection Agency (Ohio EPA) requested that American Steel Foundries submit plans and an operational report for their disposal of solid wastes as defined by the newly amended regulations and also to secure a Permit-to- Install for the disposal of sludges. American Steel Foundries responded in April 1979 by stating that they did not feel that the regulations applied to them.

In May 1979, the Ohio EPA requested that American Steel Foundries perform leachate tests on the slag and foundry sand to determine whether the material was exempt, or solid waste. American Steel Foundries refused. On May 8, 1979, citing American Steel Foundries for failure to submit detailed information as required by Ohio Administrative Code 3745-27-09, the Ohio EPA requested the Mahoning County General Health District to initiate a legal action against American Steel Foundries.

On July 9, 1979, American Steel Foundries requested a hearing under the provisions of Ohio Revised Code 119.06, claiming that the law did not impose solid waste licensing requirements on them and the Ohio EPA was therefore exceeding its authority. On September 10, 1979, a motion to dismiss was filed by the Attorney General for lack of jurisdictional basis to conduct the hearing.

On July 31, 1979, Ohio EPA conducted a sampling inspection. The results of the samples found some evidence for the contamination of surface waters at the site by heavy metals and phenols.

On August 4, 1980, American Steel Foundries filed a Notification of Hazardous Waste Activity. On November 18, 1980, American Steel Foundries filed a Part A Application for the landfill disposal of D006 (toxic for cadmium) waste. The facility entered interim status on November 19, 1980.

On June 16, 1981, American Steel Foundries amended its Part A Application. It lists the landfill management of D006 wastes, but then went on to say that the material was pretreated (essentially, diluted) and was not hazardous when it was actually placed in the disposal facility. On July 16, 1981 and June 25, 1982, American Steel Foundries petitioned for withdrawal of its Part A Permit status. On April 19, 1983, the withdrawal was granted by the United States Environmental Protection Agency (USEPA), based on the information submitted by American Steel Foundries.

In November 1984, the Ohio EPA conducted a hazardous waste inspection at the American Steel Foundries disposal facility. The purpose of the inspection was to verify American Steel Foundries' request for the withdrawal of their Part A Application. At this time, Ohio EPA suggested that American Steel Foundries split samples with the Ohio EPA of the foundry sand, electric arc furnace dust and sand washer sludge.

On February 12, 1985, these samples were taken and split between American Steel Foundries and the Ohio EPA. Ohio EPA results indicated that the electric arc furnace baghouse dust was D006 (cadmium) hazardous.

On April 5, 1985, the Mahoning County General Health District ordered American Steel Foundries to cease operations at the site. On June 7, 1985, American Steel Foundries responded that the material being disposed of in the landfill was not hazardous and that they would not comply with the order.

In April 1985, an inspection of the disposal facility was conducted by Ohio EPA to evaluate compliance with Ohio's hazardous waste regulations. The American Steel Foundries disposal facility was found to be in violation of several applicable regulatory requirements. American Steel Foundries did not pursue compliance at that time.

On August 14, 1985, Ohio EPA again split samples of the electric arc furnace baghouse dust with American Steel Foundries. Ohio EPA results indicated that the dust was D006 (cadmium) hazardous for toxicity. American Steel Foundries results indicated that the dust was D006 (cadmium) and D008 (lead) hazardous for toxicity. American Steel Foundries continued to maintain that the material lost its characteristic of toxicity before it was taken to the landfill because it was mixed with other waste streams prior to transportation.

On November 8, 1985, American Steel Foundries became a 'loss of interim status' (LOIS) site for their on-going failure to meet ground water monitoring and financial assurance requirements.

On November 29, 1985, the Mahoning County General Health District once again ordered American Steel Foundries to cease disposal operations at the facility. On December 3, 1985, the Mahoning County General Health District brought the case before the Mahoning County Board of Health. The Board of Health refused the petition to order American Steel Foundries to cease disposal operations. Disposal continued at the site.

In November 1985, the Ohio EPA prepared a CERCLA Preliminary Assessment for the site. In response, American Steel Foundries conducted an environmental assessment/ impact study of the disposal site. This study and the hydrogeological work completed in the summer of 1985 included the installation of ground water monitoring wells. The report in its final form was completed in February 1986 and submitted to the Ohio EPA.

On August 6 and 7, 1986, a sampling inspection by the USEPA was conducted. Results indicated that electric arc furnace baghouse dust generated by American Steel Foundries was hazardous for the toxicity characteristics of cadmium (D006) and lead (D008).

On August 22, 1986, the USEPA initiated an enforcement action against American Steel Foundries and referred the case to the Department of Justice (DOJ) on September 30, 1986. On May 26, 1987, a complaint was filed by USEPA and DOJ against American Steel Foundries alleging at least:

1) The disposal of hazardous waste (electric arc furnace baghouse dust) without a permit and without interim status after June 25, 1982 (the date of their petition to withdraw);

2) Failure to submit a Part B application or to certify compliance with ground water monitoring and financial responsibility requirements by November 11, 1985;

3) Continued disposal of hazardous waste beyond November 8, 1985; and

4) Failure to submit adequate closure and post-closure plans after the loss of interim status.

Additional violations discovered during an August 1987 Ohio EPA inspection were added to the enforcement action in January, 1988.

In a letter dated January 26, 1988, Ohio EPA attempted to arrange for a Comprehensive Ground Water Monitoring Evaluation (CME) inspection at the facility. American Steel Foundries initially responded by denying Ohio EPA access. After resolving some differences, the CME inspection was conducted on April 20, 1988. The final CME report was dated June 21, 1988.

In conjunction with the April 1988 CME inspection, the Ohio EPA conducted an inspection for compliance with Ohio's hazardous waste laws and regulations (Compliance Evaluation Inspection, or 'CEI'). American Steel Foundries was found to be in continuing violation of applicable hazardous waste laws and regulations.

At that time, American Steel Foundries stated that they had ceased disposing of electric arc furnace baghouse dust at the Sebring facility as of May 1987.

Over the next several years, Ohio EPA continued citing American Steel Foundries for violations. American Steel Foundries continued to deny that they had committed any violations, maintaining that the material placed in the landfill was neither solid nor hazardous waste.

On July 3 and 5, 1990, Ohio EPA conducted a CEI of the facility under a search warrant. (American Steel Foundries had previously denied inspectors access.) Based on the findings of that inspection, the Ohio EPA issued American Steel Foundries a Notice of Violation on November 29, 1990. American Steel Foundries denied that any violations had occurred, and stated that the materials they were placing in the landfill were not solid wastes under the regulations.

A CME inspection was conducted on October 25, 1990, by Ohio EPA. The final report was issued on January 4, 1991. This is the most recent CME conducted at the facility. The following violations were cited:

1) Failure to implement a ground water monitoring program capable of determining the facility's effect upon the uppermost aquifer underlying the facility;

2) Failure to install a representative upgradient well;

3) Failure to verify that downgradient wells would allow immediate detection of a release;

4) Failure to prepare a Sampling and Analysis Plan (SAP);

5) Failure to determine background concentrations for drinking water quality standards;

6) Failure to obtain appropriate annual and semi-annual analyses; and

7) Failure to develop a Ground Water Quality Assessment Plan (GWQAP). The GWQAP is actually a ground water monitoring detection program.

American Steel Foundries did not respond within the allotted time span. However, as of March 21, 1995, American Steel Foundries has developed an approved Sampling and Analysis Plan (violation four), developed an approved Ground Water Quality Assessment Plan (violation seven) and appears to have installed appropriate upgradient wells (violation two). American Steel Foundries has proposed to address violations five and six by implementing a site specific target analyte list. Violations one and three appear to remain outstanding as of March 21, 1995.

On December 17, 1990, all disposal operations at the facility were terminated by American Steel Foundries.

On November 1, 1991, American Steel Foundries and the USEPA entered into a proposed settlement with the signing of a draft Consent Decree-Findings and Orders. The draft orders stipulated, among other things, that American Steel Foundries would:

1) Submit a Closure Plan for the Sebring facility, and revise or modify it if not approvable (submitted and currently undergoing revision and modification);

2) Implement the Closure Plan upon approval;

3) Establish financial assurance mechanisms and liability coverage for the Sebring facility;

4) Develop an approvable Ground Water Sampling and Analysis Plan and an approvable Ground Water Quality Assessment Plan (completed); and

5) Design, install and maintain an adequate ground water monitoring system (the evaluation of which is the object of this inspection).

The orders also stipulated reporting requirements and general operating requirements. The draft Consent Decree was submitted to the Department of Justice for submittal to the Court. The Department of Justice had concerns about the content of the draft Consent Decree, and delayed submitting it to the United States District Court pending a review of the document.

On November 26 and 27, 1991, Ohio EPA performed a CEI at the facility. Based on the results of that inspection, a Notice of Violation was issued to American Steel Foundries on January 14, 1992. Ohio EPA acknowledged the correction of a number of operating requirement violations in a letter dated March 3, 1992. Ohio EPA did not require American Steel Foundries to address the remaining outstanding violations at that time, pending resolution of the USEPA enforcement case.

In April, 1992, American Steel Foundries submitted a Ground Water Sampling and Analysis Plan and a Ground Water Quality Assessment Plan to the Ohio EPA. These plans were approved on October 13, 1993.

On October 19, 1992, the USEPA informed American Steel Foundries that they were required to have a Preliminary Assessment/ Visual Site Inspection (PA/VSI) performed on the Sebring facility. American Steel Foundries responded on October 29, 1992, by denying the USEPA's contractor access and refusing to supply any of the information USEPA had requested. The PA/VSI does not appear to have been conducted as of March 21, 1995.

On December 1, 1992, the Consent Decree (The United States v. Amsted Industries, Inc. Civil Action No. C87-1284A) was signed by Judge Lambros in the United States District Court. The document signed was essentially unchanged from the draft submitted to the Department of Justice.

On January 20, 1993, Ohio EPA performed a CEI at the facility. Based on the results of that inspection, a Notice of Violation was issued to American Steel Foundries on February 3, 1993. Ohio EPA acknowledged the correction of some operating requirement violations in a letter dated April 7, 1993. The Ohio EPA recognized continued compliance with the December 1, 1992, Consent Decree as satisfactory interim abatement of the remaining outstanding violations.

On February 16, 1993, American Steel Foundries submitted a Closure Plan for the Sebring facility, proposing to close as a landfill. Ohio EPA performed an extensive review of this plan and prepared a draft Notice of Deficiency dated April 1, 1994. Over 150 deficiencies were identified which American Steel Foundries needed to address in a revision. This draft was presented to American Steel Foundries during a meeting with the facility on May 23, 1994. American Steel Foundries agreed to take the deficiencies under advisement and no formal action was taken by the Director of the Ohio EPA on the Notice of Deficiency.

On July 25, 1994, officials from the Ohio EPA and American Steel Foundries met to attempt to resolve outstanding issues regarding the closure of the Sebring facility.

Agreement was reached on at least the following major points:

1) Regarding a toe of waste which is spilling into Tecumseh Pond, American Steel Foundries agreed to engineer and construct some sort of physical barrier separating the majority of the waste from the pond. Although full isolation may not be possible due to the interconnectivity of the underlying rock and associated fractures, this separation was required in order to define the RCRA unit.

2) The primary hazard at the landfill seems to arise from the lateral flow of ground water through the waste. Therefore, the construction of a B.A.T. RCRA cap would only provide a marginal incremental benefit over an 'old fashioned' solid waste type cap, at a greatly increased expense. Ohio EPA agreed that American Steel Foundries could choose to install a cap meeting sanitary (solid waste) landfill cap requirements in lieu of a B.A.T. hazardous waste cap.

3) American Steel Foundries was required to upgrade the monitoring well system to ensure if contaminants did reach the ground water and begin moving off site, they would be immediately detected. Ten or more wells may be required.

4) American Steel Foundries was required to address the contingencies in their Post-Closure Plan if the monitoring system did detect contamination, especially how to confirm that the contamination was present, how to define the extent of the plume of contamination and how to remediate the contamination.

A ground water monitoring program is on-going at this site. The most recent report received by the Ohio EPA presents data from a June 15 to 17, 1994, sampling event. A sampling event apparently took place the week of September 12, 1994, but the Ohio EPA had not received a report on this event as of March 21, 1995.

III. REGIONAL AND SITE HYDROGEOLOGY

Regional Hydrogeologic Setting

The American Steel Foundries is located in Smith Township, Ashtabula County. The U.S.G.S. topographic 7.5 minute quadrangle map for the area (Figure 1) indicates that surface drainage from the site is south-westerly to an unnamed tributary of the Mahoning River. The facility is approximately 4,000 feet northeast of the Mahoning River.

The facility lies within the Glaciated Appalachian Plateau Physiographic Province. The county soils report (USDA, 1971) notes that several types of glacial drift of Wisconsin age are exposed at the surface. Glaciers apparently had crossed the county before the Wisconsin glaciation because deposits of Illinoian and pre-Illinoian drifts are buried beneath the Wisconsin drift in Columbiana County to the south. The drifts of Wisconsin age were deposited during three substages of the Grand river lobe of the late Wisconsin glacial period (Ohio EPA, 1990). The surficial deposits southwest of the City of Sebring are mapped as ground moraine with large Kent end-moraine deposits lying approximately two miles to the southwest. The end moraine deposits apparently consist mainly of Lavery tills (Bowser-Morner Consultants, 1986).

The native soils on site have been disturbed due to the strip mining activities. Bedrock apparently is overlain by only a thin veneer of glacial drift. In the vicinity of the city of Sebring, this drift averages less than 25 feet in thickness (Stout et al., 1943). Bedrock beneath the till consists of sedimentary rocks of the Pennsylvanian Age, Allegheny and Pottsville Groups. The sequence consists of alternating layers of thick and thin layers of sandstone and shale with thin lenses of limestone and coal. In Mahoning County in the vicinity of the ASF facility, the bedrock layers dip generally to the southwest at an approximate grade of one percent (Bowser-Morner Consultants, 1986). Apparently, no known buried valleys are present in the vicinity of the City of Sebring. However, along the general course of the Mahoning River, there is evidence of an old valley floor (Stout et al., 1943). Valley fill in the vicinity of Alliance, approximately one mile west of the ASF disposal facility, serves as a major aquifer in the region (Ohio EPA, 1990).

According to Crowell (1979), all of the bedrock sandstone formations in Mahoning County yield adequate supplies of water for farm and suburban home use. The shale layers and limestone beds may yield moderate amounts of water. The unconsolidated deposits range from glacial clays on the surface which yield little or no water, to coarse, well-sorted gravel deposits which, when adjacent to a surface stream, may yield over 500 gallons per minute.

Terrace gravels adjacent to the Mahoning River have yielded over 1,000 gallons per minute in several wells; however, the formation is not horizontally consistent for any considerable distance and extensive drilling is required to locate new supplies (Cummins, 1960). This same type of gravel deposit, located a distance from the river, will not yield large quantities of water.

Major bedrock aquifers in the county consist of the Clarion Shale Member of the Allegheny Group (Stout et al., 1943) and the Homewood, Connoquenessing and Sharon Members of the Pennsylvania Pottsville Group (Sedam, 1973) as well as the Mississippian Berea Sandstone (Crowell, 1979).

Site Geology and Hydrogeology

Bowser and Morner (1986) completed an Environmental Assessment of the landfill in 1985. Five borings were completed at the facility and four of them were converted into ground water monitoring wells. In August 1991, five additional ground water monitoring wells were installed under the direction of Residual Management Technology, Inc. (RMT). In November 1993, eight ground water monitoring wells were installed as specified in the 1992 GWQAP. As part of the landfill closure, four ground water monitoring wells were installed in March 1995 by Roy F. Weston, Inc.

The disposal facility is located within a former strip-mine pit. The Middle Kittanning No. 6 and Lower Kittanning No. 5 coal beds were strip mined in addition to the Lower Kittanning underclay and some of the softer underlying clay. The native soils and glacial deposits at the disposal facility were removed during strip mining operations. Mine spoil was placed along the northern, western and southern edges of the strip pit. Mine spoil was not placed hydraulically upgradient, east of the landfill. The spoils material is generally fine-grained. Gravel and cobble sized material found in the spoils usually consists of shale of siltstone bedrock fragments (RMT, 1994a).

The thickness of the spoils along the western side of the landfill ranges from approximately eleven feet at MW-20 to 43 feet at MW-22P. Based on existing borings, spoils are present along the entire western perimeter of landfill. The thickest spoils are likely in the northwest corner of the site (RMT, 1994a)

Bedrock in the area consists of sedimentary rocks of the Pennsylvanian Age, Allegheny and Pottsville Groups. The Clarion Shale appears to be the first laterally continuous bedrock unit underlying the landfill. Waste was placed directly upon the Clarion Shale in the landfill. American Steel Foundries has not adequately described the bedrock geology at the landfill as required by OAC Rule 3745-65-90. American Steel Foundries has not described the type, depth and thicknesses of the formations. The age and formal names of the deposits have not been determined.

Investigations at the landfill identified two water bearing zones in the area. A water table aquifer occurs in the waste, mine spoil and upper sections of the Clarion Shale. Ground water also occurs in the deeper more competent sections of the Clarion Shale. American Steel Foundries considers Clarion Shale to be the uppermost aquifer at the facility (RMT, 1994a). The Ohio EPA considers the mine spoil and Clarion Shale, including the deeper sections, to be the uppermost aquifer as specified in Rule 3745-65-90(A) of the Ohio Administrative Code. Waste is in direct contact with the mine spoil and Clarion Shale, including the deeper more competent portions of the shale.

American Steel Foundries has not adequately characterized the hydrogeology in the vicinity of the landfill as required by OAC Rule 3745-65-90. The hydrogeologic relationship between 1) the saturated mine spoil; 2) the saturated upper sections of the Clarion Shale and 3) the deeper more competent sections of the Clarion Shale must be characterized. The competency of the Clarion Shale and how it effects the water bearing capabilities of the Clarion Shale has not been adequately characterized. American Steel Foundries has not adequately characterized the relationship between nearby surface water bodies and the effects they have on the ground water underlying the facility.

The uppermost aquifer, as defined by the Ohio EPA, is unconfined and flows to the west in the northern half of the landfill and flows to the southwest in the southern half of the landfill. Figure 2 was constructed with the static water levels collected during the CME inspection (Table 1). This agrees with the previously determined flow patterns. There is little change in the ground water flow direction due to seasonal variations.

The horizontal hydraulic gradient is steeper in the eastern portion of the property (approximately 0.02) compared to the western portion of the property (approximately 0.001)(RMT, 1994b).

Vertical gradients were calculated for the well nests and are presented in Table 2. Vertical gradients vary seasonally at well nests MW-1A/MW-1 and MW-4A/MW-4. Gradients are upward during the winter and early spring months and downward (ground water recharge conditions) during the summer months. The vertical gradient at well nest MW-19/MW-19P is strongly downward, probably a result of the low hydraulic conductivity of the shale. Vertical gradients were consistently downward at well nest MW-21/MW-21P and upward at well nest MW-22/MW-22P (RMT, 1994b).

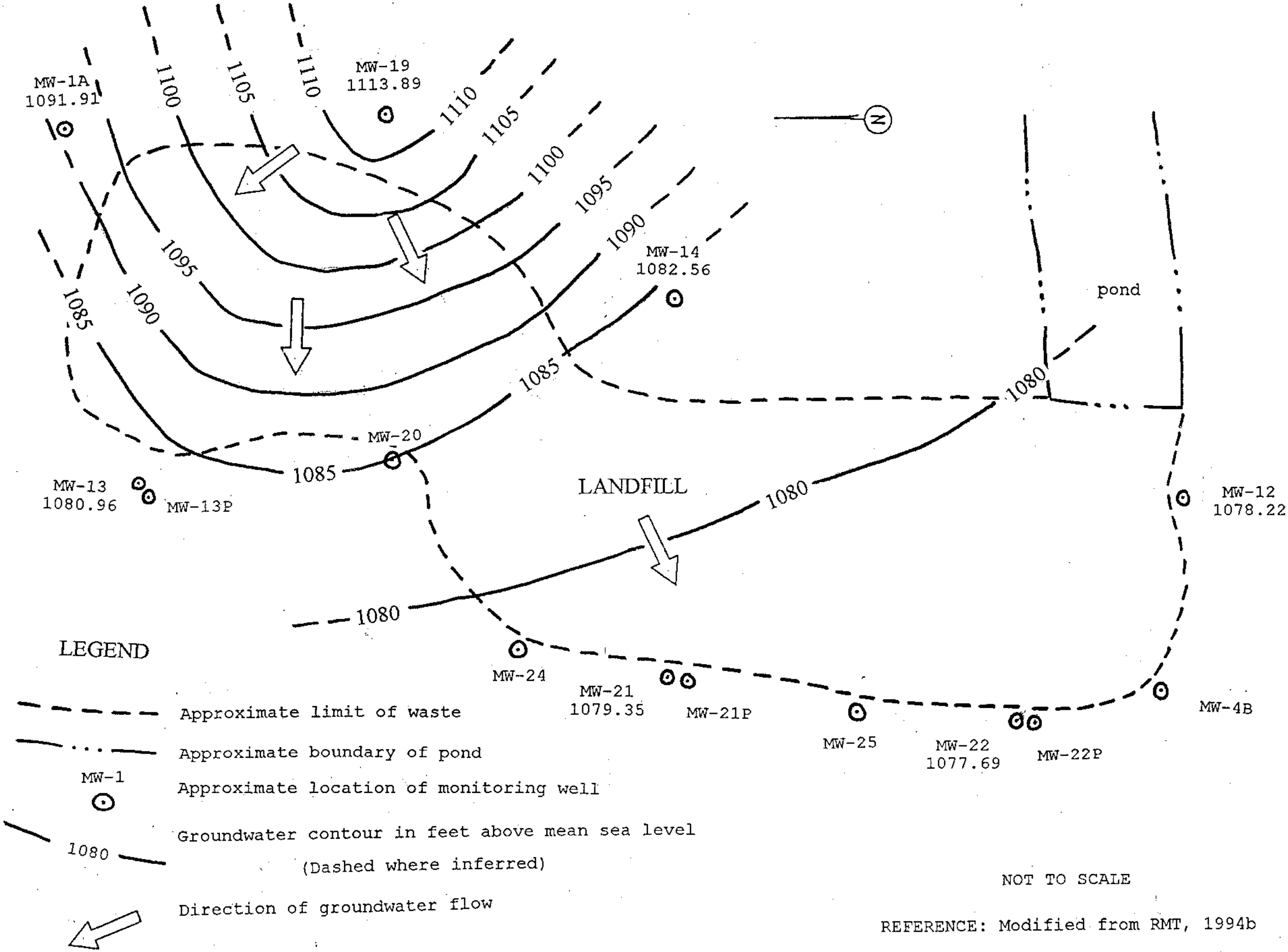


FIGURE 2
MARCH 21, 1995 POTENTIOMETRIC MAP

TABLE 1

MARCH 21, 1995
STATIC WATER LEVELS AND TOTAL WELL DEPTHS

Well	Depth to Water (ft)	Top of Casing (North Side)	Static Water Level	Total Well Depth (ft)	Total Well Depth at Installation (ft)
MW-1A (UP)	34.17	1126.09	1091.92	42.54	42.09
MW-4B (DN)	7.94	*1	*1		*1
MW-12 (DN)	9.72	1087.94	1078.22	37.50	37.84
MW-13 (DN)	26.74	1107.7	1080.96	39.69	40.0
MW-13P (DN)	26.12	*1	*1	32.30	*1
MW-14 (UP)	48.62	1131.18	1082.56	62.80	63.78
MW-19 (UP)	27.27	1141.16	1113.89	34.70	34.26
MW-20 (DN)	32.00	UNK	UNK	41.50	UNK
MW-21 (DN)	21.73	1101.08	1079.35	32.60	33.58
MW-21P (DN)	21.68	1099.62	1077.94	67.31	66.52
MW-22 (DN)	13.10	1090.79	1077.69	22.11	22.19
MW-22P (DN)	19.43	1091.05	1071.62	67.10	67.05
MW-23 (SIDE)	18.83	1107.49	1088.66	27.55	27.89
MW-24 (DN)	30.37	*1	*1	45.22	*1
MW-25 (DN)	18.00	*1	*1	30.30	*1

1 - Well was installed in March 1995 and the information has not been submitted to the Ohio EPA

Table 2
VERTICAL GROUNDWATER GRADIENTS
SEBRING FACILITY
AMERICAN STEEL FOUNDRIES
ALLIANCE, OHIO

Well Nest	Formation Well Is Screened In	12/14-17/93 Groundwater Elevation	12/14-17/93 Vertical Gradient	3/15-16/94 Groundwater Elevation	3/15-16/94 Vertical Gradient	6/15-17/94 Groundwater Elevation	6/15-17/94 Vertical Gradient	9/13-15/94 Groundwater Elevation	9/13-15/94 Vertical Gradient
MW-1A	Shale	1091.43	-0.0836	1092.2	-0.0053	1091.56	0.0251	1091.48	0.0014
MW-1	Shale	1092.62	(1,2)	1092.28		1091.2		1091.46	
MW-4A	Spoils\Foundry Sand	1077.15	-0.0036	1077.52	-0.0241	1076.61	0.0130	1076.72	-0.0005
MW-4	Spoils	1077.23		1078.06		1076.33		1076.73	
MW-19	Shale	1113.52	0.5168	1115.33	1.0376	1113.45	1.0011	1112.76	1.0000
MW-19P	Shale	1075.12	(3)	1038.24		1039.07		1038.46	
MW-21	Spoils	1079.3	0.0273	1080.26	0.0224	1078.56	0.0297	1079.52	0.0612
MW-21P	Shale	1078.25		1079.4		1077.42		1077.17	
MW-22	Spoils	1077.83	0.1201	1078.74	0.1169	1077.18	0.1049	1077.2	0.1176
MW-22P	Shale	1071.63		1072.6		1071.83		1071.2	

Notes:
(1) Negative value for vertical gradient indicates upward vertical gradient
(2) Positive value for vertical gradient indicates downward vertical gradient
(3) Vertical gradients for well nest MW-19/MW-19P may not be accurate because this well recovers very slowly.

AJS - c:\projects\asf\vertgra.wk3; date 27-Oct-94

IV. GROUND WATER MONITORING SYSTEM

Ground Water Monitoring History

In July 1985, the initial ground water monitoring wells were installed at the landfill: MW-1, MW-2, MW-3 and MW-4. In August 1991, five ground water monitoring wells: MW-1A, MW-4A, MW-12, MW-13 and MW-14, were installed under the direction of RMT. Eight ground water monitoring wells: MW-19, MW-19P, MW-21, MW-21P, MW-22, MW-22P, MW-23 and MW-23P were installed in November 1993 by Summit Drilling under the supervision of RMT. Four ground water monitoring wells: MW-4B, MW-13P, MW-24 and MW-25 were installed in March 1995 by Roy F. Weston, Inc. The facility is currently in detection monitoring.

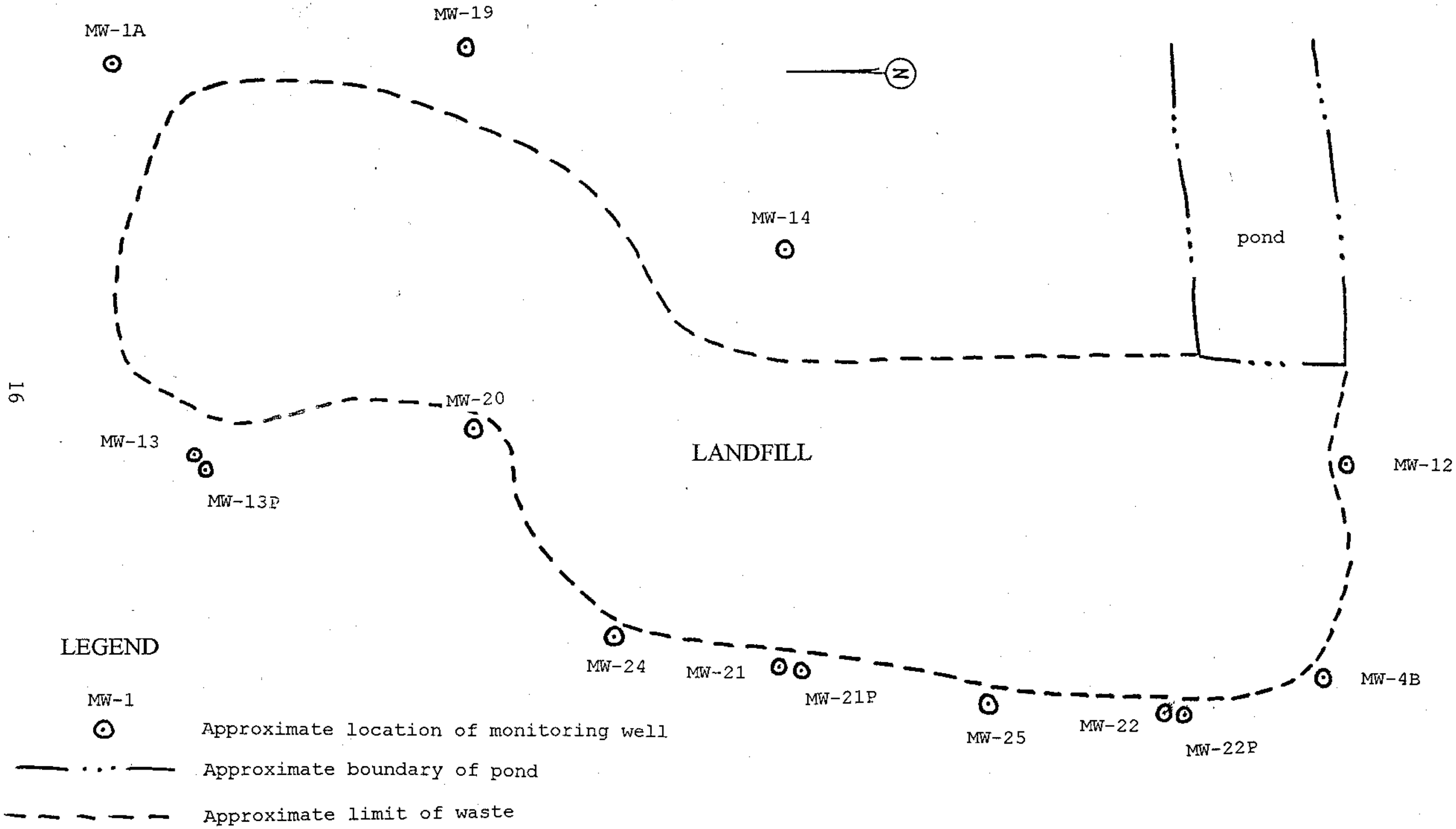
Monitoring Well Placement

The fifteen ground water monitoring wells which make up the detection monitoring system were inspected during the CME inspection. Figure 3 depicts the approximate locations of the wells. Three wells: MW-1A, MW-14 and MW-19 are upgradient of the landfill and meet the requirements of OAC Rule 3745-65-91(A)(1). Monitor well MW-23, which is completed in the mine spoil, is sidegradient of the landfill and has been approved by the Ohio EPA for use as an upgradient well as specified in OAC Rule 3745-65-91(A)(1). Eleven Wells: MW-4B, MW-12, MW-13, MW-13P, MW-20, MW-21, MW-21P, MW-22, MW-22P, MW-24 and MW-25 are downgradient of the landfill and meet the requirements of OAC Rule 3745-65-92 (A)(2).

Monitoring Well Installation and Construction

Between July 9 and 11, 1985, five borings were competed at the facility. Four of the five borings were completed as ground water monitoring wells: MW-1, MW-2, MW-3 and MW-4. American Steel Foundries does not plan to use any of these wells in the ground water monitoring detection program. Details of the monitor well construction were given diagrammatically in the consultants report (Bowser-Morner Consultants, 1986) with no narrative description (Ohio EPA, 1990). The borings were made with a truck-mounted boring rig using hollow stem augers and employing standard penetration resistance methods (140 pound hammer, 30-inch drop, 2-inch O.D. split-spoon sampler) at maximum intervals of 5 feet or at major changes in stratum. The wells were constructed of 2-inch schedule 40 PVC casing. The well's screens consist of five foot sections of 2-inch schedule 40 PVC with 0.010 inch slots. In addition, a five foot long 6-inch diameter black iron guard pipe with a locking cap and lock was installed at each well (Ohio EPA, 1990). The screens were packed in sand and the annular space was sealed with bentonite to the ground surface where a protective cement apron was then emplaced (Bower-Morner Consultants, 1986). The dimensions of the sand pack were not given. The well elevations were surveyed in November 1991.

In August 1991, five ground water monitoring wells: MW-1A, MW-4A, MW-12, MW-13 and MW-14, were installed under the direction of RMT. American Steel Foundries proposes to use: MW-1A, MW-12, MW-13 and MW-14 in the ground water monitoring detection system. Details of the monitor well construction are illustrated in Figures 4, 5, 6 & 7. The boreholes were advanced with augers until refusal and bedrock drilling was completed with an air rotary rig. All five wells were constructed with two inch inside diameter schedule 40 PVC riser casing with ten foot sections of 0.010 inch slot schedule 40 PVC flush threaded well screen. A five foot silica sand pack was placed above the top of the well screen in four wells: MW-1A, MW-12, MW-13 and MW-14. The sand pack was not extended above the top of the well screen in MW-4A.



NOT TO SCALE

REFERENCE: Modified from RMT, 1994b

FIGURE 3
APPROXIMATE LOCATIONS OF THE GROUND WATER MONITOR WELLS

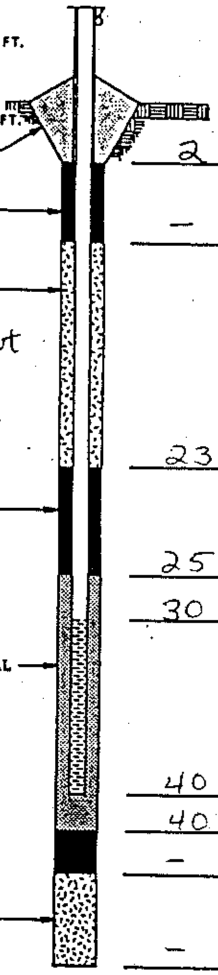
FIGURE 4

RMT INC

WELL DIAGRAM
(F-17:TFR:11/4/87)

PROJECT NAME: ASF JOB NO.: 2169.02
LOCATION: Sebring Facility WELL NO.: MW-1A
DATE INSTALLED: 8-6-91
PREPARED BY: R. Welch

MONITORING WELL CONSTRUCTION



TOP OF WELL CASING ELEV. 1126.09 FT.

GROUND SURFACE ELEV. 1123.9 FT.

DEPTH

CONCRETE SEAL/PAD 2 FT.

SEAL MATERIAL N/A — FT.

BACKFILL MATERIAL Bentonite/ Cement Grout

BACKFILL METHOD Tremie pipe 23 FT.

SEAL MATERIAL Bentonite pellets 25 FT.

30 FT.

LENGTH OF CASING 33.8 FT.

FILTER PACK MATERIAL Silica Sand

LENGTH OF SCREEN 10 FT.

WELL BOTTOM ELEV. ~1084' 40 FT.

40 FT.

SEAL MATERIAL N/A — FT.

BACKFILL MATERIAL N/A — FT.

BOREHOLE DIAMETER 10 IN. to 15 ft.
6 in to 40 ft.

DRILLING METHOD ______

DRILLING CONTRACTOR R+R International
E. Pucci

1) WELL MATERIALS

A) TYPE OF PIPE:
√ (PVC), STAINLESS, TEFLON, OTHER ______
√ PIPE SCHEDULE 40
√ PIPE DIAMETER ID 2 IN., OD ___ IN.

B) TYPE OF PIPE JOINTS:
√ SLIP, (THREADED) (W/TAPE?), OTHER ______
SOLVENT CEMENT: YES or NO

C) TYPE OF WELL SCREEN:
√ (PVC), STAINLESS, TEFLON, OTHER ______
√ SLOT SIZE: 0.010 IN.
√ SCREEN DIAMETER: ID 2 IN., OD ___ IN.

D) INSTALLED PROTECTOR PIPE W/LOCK: (YES) or NO.
PROTECTOR PIPE DIA. 4 IN. LOCK NO. ______

2) WELL DEVELOPMENT

A) METHODS
(BAILING), PUMPING, (SURGING), COMPRESSED AIR
OTHER ______

B) APPROXIMATE WATER VOLUME:
REMOVED 3 gal. ADDED ______
DURATION OR VOLUME PUMPED:
15 min.

C) WATER CLARITY:
BEFORE DEVELOPMENT
CLEAR/(TURBID)/OPAQUE
AFTER DEVELOPMENT
CLEAR/(TURBID)/OPAQUE

D) ODOR: YES or (NO)

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?
______ FT. OR (DRY)

B) OTHER MEASUREMENTS (T.O.C.):
DATE/TIME 8/13/91 18:20 DEPTH 34.6 FT.
DATE/TIME ______ DEPTH ___ FT.
DATE/TIME ______ DEPTH ___ FT.

4) ADDITIONAL COMMENTS: Location: N 11137.4 E 10629.8
Void encountered at 30 ft. depth.
Nine (80 lb) bags of sand used to fill from 30.2 to 30.4 feet.
Three (50 lb) bags of sand used to fill from 30.4 to 25 feet.

PROJ.# 20.39

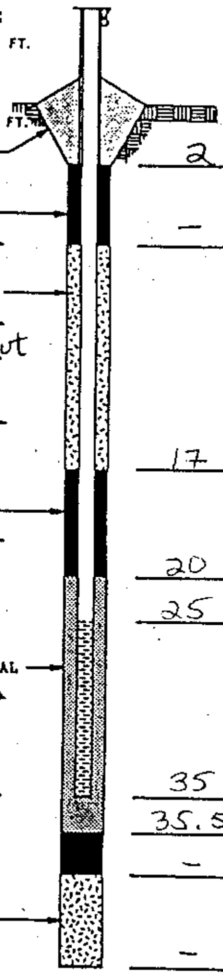
FIGURE 5

RMT INC

WELL DIAGRAM
(F-17:TFR:11/4/87)

PROJECT NAME: ASF JOB NO.: 2169.02
LOCATION: Sebring Facility WELL NO.: MW-12
DATE INSTALLED: 8-8-91
PREPARED BY: R. Welch

MONITORING WELL CONSTRUCTION



TOP OF WELL CASING ELEV. 1087.94 FT.

GROUND SURFACE ELEV. 1085.6 FT.

CONCRETE SEAL/PAD — DEPTH 2 FT.

SEAL MATERIAL N/A — FT.

BACKFILL MATERIAL Bentonite/Cement Grout

BACKFILL METHOD Tremie pipe — 17 FT.

SEAL MATERIAL Bentonite pellets — 20 FT.

LENGTH OF CASING 25 FT. — 25 FT.

FILTER PACK MATERIAL Silica Sand

LENGTH OF SCREEN 10 FT.

WELL BOTTOM ELEV. ~1047' — 35 FT.

35.5 FT.

SEAL MATERIAL N/A — FT.

BACKFILL MATERIAL N/A — FT.

BOREHOLE DIAMETER 6.5 IN.

DRILLING METHOD HSA 4.25" ID

DRILLING CONTRACTOR R+R International
E. Pucci

1) WELL MATERIALS

A) TYPE OF PIPE:
PVC, STAINLESS, TEFLON, OTHER ____
PIPE SCHEDULE 40
PIPE DIAMETER ID 2 IN., OD ____ IN.

B) TYPE OF PIPE JOINTS:
SLIP, THREADED (W/TAPE?), OTHER ____
SOLVENT CEMENT: YES or NO

C) TYPE OF WELL SCREEN:
PVC, STAINLESS, TEFLON, OTHER ____
SLOT SIZE: 0.010 IN.
SCREEN DIAMETER: ID 2 IN., OD ____ IN.

D) INSTALLED PROTECTOR PIPE W/LOCK: YES or NO
PROTECTOR PIPE DIA. 4 IN. LOCK NO. ____

2) WELL DEVELOPMENT

A) METHODS
BAILING, PUMPING, SURGING, COMPRESSED AIR
OTHER ____

B) APPROXIMATE WATER VOLUME:
REMOVED 5 gal. ADDED ____
DURATION OR VOLUME PUMPED:
40 minutes

C) WATER CLARITY:
BEFORE DEVELOPMENT
CLEAR/TURBID/OPAQUE
AFTER DEVELOPMENT
CLEAR/TURBID/OPAQUE

D) ODOR: YES or NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?
11.9 FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):
DATE/TIME 8/13/91 17:20 DEPTH 11.5 FT.
DATE/TIME ____ DEPTH ____ FT.
DATE/TIME ____ DEPTH ____ FT.

4) ADDITIONAL COMMENTS: Location: N 10036.9
E 10245.3

PROJ.# 20.99

FIGURE 6

RMT INC

WELL DIAGRAM

(F-17:TFR:11/4/87)

PROJECT NAME: ASF JOB NO.: 2169.02

LOCATION: Sebring Facility WELL NO.: MW-13

DATE INSTALLED: 8-7-91

PREPARED BY: R. Welch

MONITORING WELL CONSTRUCTION

TOP OF WELL CASING ELEV. 1107.70 FT.

GROUND SURFACE ELEV. 1106.2 FT.

CONCRETE SEAL/PAD

SEAL MATERIAL N/A

BACKFILL MATERIAL Bentonite/Cement Grout

BACKFILL METHOD Tremie pipe

SEAL MATERIAL Bentonite pellets

FILTER PACK MATERIAL Silica Sand

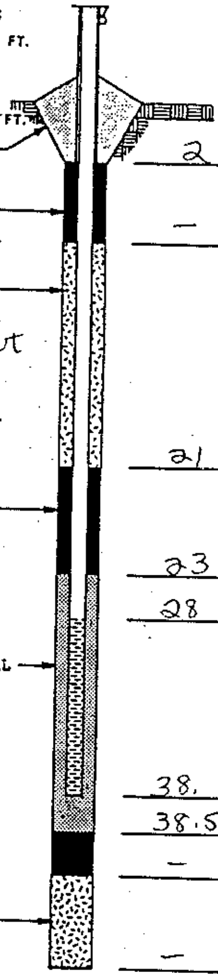
WELL BOTTOM ELEV. ~1067

SEAL MATERIAL N/A

BACKFILL MATERIAL N/A

LENGTH OF CASING 28 FT.

LENGTH OF SCREEN 10 FT.



DEPTH

2 FT.

— FT.

21 FT.

23 FT.

28 FT.

38. FT.

38.5 FT.

— FT.

— FT.

BOREHOLE DIAMETER 10 IN.

DRILLING METHOD HSA 6 1/4" ID

DRILLING CONTRACTOR R+R International E. Pucci

1) WELL MATERIALS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER ____

PIPE SCHEDULE 40

PIPE DIAMETER ID 2 IN., OD ____ IN.

B) TYPE OF PIPE JOINTS:

SLIP, THREADED (W/TAPE?), OTHER ____

SOLVENT CEMENT: YES or NO

C) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER ____

SLOT SIZE: 0.010 IN.

SCREEN DIAMETER: ID 2 IN., OD ____ IN.

D) INSTALLED PROTECTOR PIPE W/LOCK: YES or NO.

PROTECTOR PIPE DIA. 4 IN. LOCK NO. ____

2) WELL DEVELOPMENT

A) METHODS

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER ____

B) APPROXIMATE WATER VOLUME:

REMOVED 2.5 gals ADDED ____

DURATION OR VOLUME PUMPED: 15 min.

C) WATER CLARITY:

BEFORE DEVELOPMENT CLEAR/TURBID/OPAQUE

AFTER DEVELOPMENT CLEAR/TURBID/OPAQUE

D) ODOR: YES or NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT? ____ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 8/13/91 18:00 DEPTH 30.3 FT.

DATE/TIME ____ DEPTH ____ FT.

DATE/TIME ____ DEPTH ____ FT.

4) ADDITIONAL COMMENTS:

Location: N 11065.0

E 10276.7

PROJ.# 20.99

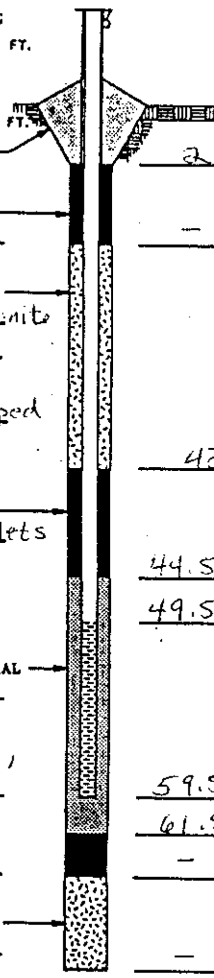
FIGURE 7

RMT INC

WELL DIAGRAM
(F-17:TFR:11/4/87)

PROJECT NAME: ASF JOB NO.: 2169.02
LOCATION: Sebring Facility WELL NO.: MW-14
DATE INSTALLED: 8-14-91
PREPARED BY: R. Welch

MONITORING WELL CONSTRUCTION



TOP OF WELL CASING ELEV. 1131.18 FT.

GROUND SURFACE ELEV. 1128.9 FT.

DEPTH

CONCRETE SEAL/PAD — 2 FT.

SEAL MATERIAL N/A — FT.

BACKFILL MATERIAL Cement/bentonite grout

BACKFILL METHOD Tremied/pumped

42 FT.

SEAL MATERIAL Bentonite pellets

44.5 FT.

49.5 FT.

LENGTH OF CASING 50 FT.

LENGTH OF SCREEN 10 FT.

FILTER PACK MATERIAL Silica Sand

WELL BOTTOM ELEV. ~1069'

59.5 FT.

61.5 FT.

SEAL MATERIAL N/A — FT.

BACKFILL MATERIAL N/A — FT.

BOREHOLE DIAMETER 10 IN. – 0 to 20 ft
6 IN. – 20 to 61.5 ft.

DRILLING METHOD HSA to 20', Air rotary to 61.5'

DRILLING CONTRACTOR R+R International
E. Pucci

1) WELL MATERIALS

A) TYPE OF PIPE:

(PVC) STAINLESS, TEFLON, OTHER ____

PIPE SCHEDULE 40

PIPE DIAMETER ID 2 IN., OD ____ IN.

B) TYPE OF PIPE JOINTS:

SLIP, (THREADED) (W/TAPE?), OTHER ____

SOLVENT CEMENT: YES or (NO)

C) TYPE OF WELL SCREEN:

(PVC) STAINLESS, TEFLON, OTHER ____

SLOT SIZE: 0.010 IN.

SCREEN DIAMETER: ID 2 IN., OD ____ IN.

D) INSTALLED PROTECTOR PIPE W/LOCK: (YES) or NO.

PROTECTOR PIPE DIA. 4 IN. LOCK NO. ____

2) WELL DEVELOPMENT

A) METHODS

(BAILING), PUMPING, (SURGING), COMPRESSED AIR

OTHER ____

B) APPROXIMATE WATER VOLUME:

REMOVED 5 gal. ADDED ____

DURATION OR VOLUME PUMPED:
30 min.

C) WATER CLARITY:

BEFORE DEVELOPMENT
CLEAR/(TURBID)/OPAQUE

AFTER DEVELOPMENT
CLEAR/(TURBID)/OPAQUE

D) ODOR: YES or (NO)

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?
____ FT. OR (DRY)

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME 8/14/91 7:00 DEPTH 49.8 FT.

DATE/TIME ____ DEPTH ____ FT.

DATE/TIME ____ DEPTH ____ FT.

4) ADDITIONAL COMMENTS:

Location: N 10540.3
E 10453.4

PROJ.# 20.99

The method of sand emplacement was not specified. Annular seals comprised of bentonite pellets and varying in thickness from 2 to 3.5 feet were installed directly above the sand packs. In MW-1A, MW-12, MW-13 and MW-14 annular seals of bentonite/cement grout were tremied to within two feet of the surface. The annular space in MW-4A was filled with bentonite pellets to within one foot of the surface. The pellets were dropped into place. Four inch diameter steel, locking protective casings and concrete pads were installed around all five wells.

Eight ground water monitoring wells: MW-19, MW-19P, MW-21, MW-21P, MW-22, MW-22P, MW-23 and MW-23P were installed in November 1993 by Summit Drilling under the supervision of RMT. American Steel Foundries proposes to use: MW-19, MW-21, MW-21P, MW-22, MW-22P and MW-23 in the ground water monitoring detection system. The construction details for the wells to be included in the ground water detection monitoring program are illustrated in Figures 8 through 14. The boreholes were advanced using hollow stem and clear water rotary drilling techniques (RMT, 1992). The shallow wells: MW-19, MW-21, MW-22 and MW-23 were constructed with two inch inside diameter schedule 40 PVC riser casing with ten foot sections of 0.010 inch slot schedule 40 PVC flush threaded well screen. The deep wells: MW-19P, MW-21P, MW-22P and MW-23P were constructed with two inch inside diameter schedule 80 PVC riser casing with five foot sections of 0.10 inch slot schedule 80 PVC flush threaded well screen. Coarse silica sand was used for filter pack material. In MW-21P, the filter pack does not extend above the top of the screen. In the remaining seven wells, the filter pack extends two feet above the top of the screen. The method of sand emplacement was not specified. One to four feet of fine Colorado silica sand was emplaced above the filter pack. Annular seals of an undisclosed thickness were installed using the gravity fill method in wells: MW-19, MW-20, MW-21, MW-22 and MW-23. The seals are made up of SAA 3/8 inch holeplug bentonite chips. MW-21P has a three foot annular seal made up of 3/8 inch bentonite pellets. MW-22P has two foot annular seal made of 3/8 inch bentonite pellets. An annular seal was not installed in MW-19P. In all eight wells, the annular space was sealed with 3/8 inch holeplug bentonite chips. Four inch diameter steel, locking protective casings and concrete pads were installed around all eight wells.

In March 1995, four ground water monitoring wells: MW-4B, MW-13P, MW-24 and MW-25, were installed under the direction of Roy F. Weston, Inc. The Ohio EPA has not received the well logs for these wells and is unable to determine if the wells have been installed as described in the December 1994 Closure Plan and if they meet the requirements of OAC Rule 3745-65-91(C).

Monitoring Well Maintenance

The fifteen detection monitoring wells were evaluated during the CME inspection. The following observations were noted regarding the maintenance of the wells. Permanent reference marks for the measurement of static water levels have not been marked on the inner casings of MW-19, MW-24, MW-13P, MW-20, MW-24 and MW-25. Three wells, MW-21, MW-21P and MW-25, are not properly labeled. The concrete pad surrounding MW-21P was covered and not visible. The Ohio EPA recommends that American Steel Foundries uncover the pad, inspect it and repair as needed. The Ohio EPA recommends that bumper guards be installed around those wells which will be located in high traffic areas during closure activities. Seven wells: MW-1A, MW-14, MW-4B, MW-12, MW-13, MW-22 and MW-22P, have been maintained to meet the minimum requirements of OAC Rule 3745-65-91(C).

FIGURE 8

American Steel Foundries

RMT

PROJECT NAME: Sebring Facility NO. 2169.17

WELL NO. MW-19

DATE INSTALLED 11-22-93

ELEV. (T.O.C.)

GROUND SURF. ELEV. 1141.16

1138.7

DEPTH FROM GROUND SURFACE 0 FT.

BENTONITE PELLETS/GRANULAR/POWDER 3/8" Holeplug Benlonite Chips ____ FT.

BACKFILL MATERIAL 3/8" Holeplug Benlonite Chips

LENGTH OF SOLID PIPE 45 FT.

BACKFILL METHOD

PIPE TREMIE/AUGER TREMIE GRAVITY FILLED

BOREHOLE DIA. 10 IN.

____ FT.

BENTONITE PELLETS/GRANULAR/POWDER SAA 3/8" Holeplug Benlonite Chips 18 FT.

SILICA SAND Fine Colorado Silica Sand 20 FT.

FILTER PACK MATERIAL Coarse Silica Sand 22 FT.

WELL SCREEN LENGTH) FT.

WELL BOTTOM ELEV. ____ 32 FT. 32 FT.

SEAL MATERIAL 3/8" Holeplug Benlonite Chips 34 FT.

BACKFILL MATERIAL Coarse Silica Sand 44 FT.

1) CASING DETAILS

A) TYPE OF PIPE: PVC, STAINLESS, TEFLON, OTHER ____

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS: COUPLINGS, THREADED (W/TAPE?), OTHER ____

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN: PVC STAINLESS, TEFLON, OTHER ____

E) WELL SCREEN SLOT SIZE 0.010

F) PIPE DIA: ID IN. 2.0 OD IN. 2.3

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO

PROTECTOR PIPE DIA. 4 IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER ____

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 20 min.

C) APPROXIMATE WATER VOLUME: REMOVED 2 gal.

ADDED ____

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

____ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME static 27 FT.

DATE/TIME ____ FT.

DATE/TIME ____ FT.

ADDITIONAL COMMENTS: ____

FIGURE 9

RMI

American Steel Foundries

PROJECT NAME: Sebring Facility NO. 2169.17

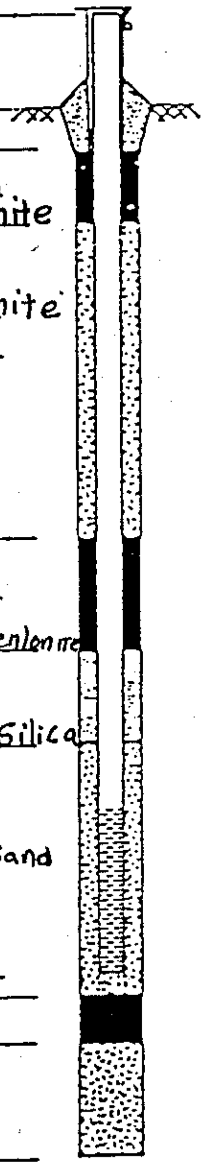
WELL NO. MW-20

DATE INSTALLED 11-8-93

ELEV. (T.O.C.) 1113.21

GROUND SURF. ELEV. 1110.7

DEPTH FROM GROUND SURFACE 0 FT.



BENTONITE PELLETS/GRANULAR/POWDER 3/8" Holeplug Bentonite Chips — NA FT.

BACKFILL MATERIAL 3/8" Holeplug Bentonite Chips

LENGTH OF SOLID PIPE 31.5 FT.

BACKFILL METHOD PIPE TREMIE/AUGER TREMIE GRAVITY FILLED

BOREHOLE DIA. ___ IN.

NA FT.

BENTONITE PELLETS/GRANULAR/POWDER SAA 3/8" Holeplug Bentonite Chips — 24 FT.

SILICA SAND Fine Colorado Silica Sand — 27 FT.

FILTER PACK MATERIAL Coarse Silica Sand — 29 FT.

WELL SCREEN LENGTH 0 FT.

WELL BOTTOM ELEV. ___ — ~~29~~ 34 FT.

SEAL MATERIAL NA — ___ FT.

BACKFILL MATERIAL NA — ___ FT.

1) CASING DETAILS

A) TYPE OF PIPE: PVC, STAINLESS, TEFLON, OTHER ___

PIPE SCHEDULE 80

B) TYPE OF PIPE JOINTS: COUPLINGS, THREADED (W/TAPE?), OTHER ___

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN: PVC, STAINLESS, TEFLON, OTHER ___

E) WELL SCREEN SLOT SIZE 0.010

F) PIPE DIA: ID IN. 2.0 OD IN. 2.3

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO PROTECTOR PIPE DIA. 4 IN.

2) WELL DEVELOPMENT

A) METHOD BAILING, PUMPING, SURGING, COMPRESSED AIR OTHER ___

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 3 hrs.

C) APPROXIMATE WATER VOLUME: REMOVED 70 gal. ADDED ___

D) WATER CLARITY BEFORE DEVELOPMENT? CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT? CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT? ___ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME Static 33.1 FT.

DATE/TIME ___ FT.

DATE/TIME ___ FT.

ADDITIONAL COMMENTS: ___

FIGURE 10

RMT

Well
F-17 ... (11-85)

American Steel Foundries

PROJECT NAME: Sebring Facility NO. 2169.17

WELL NO. MW-21

DATE INSTALLED 11-24-93

ELEV. (T.O.C.) 1101.12

GROUND SURF. ELEV. 1098.6

DEPTH FROM GROUND SURFACE 0 FT.

BENTONITE PELLETS/GRANULAR/POWDER
3/8" Holeplug Bentonite Chips
NA FT.

BACKFILL MATERIAL
3/8" Holeplug Bentonite Chips

LENGTH OF SOLID PIPE 2.5 FT.

BACKFILL METHOD
PIPE TREMIE/AUGER TREMIE
GRAVITY FILLED

BOREHOLE DIA. 10 IN.

NA FT.

BENTONITE PELLETS/GRANULAR/POWDER
SAA
16 FT.

SILICA SAND
Fine Colorado Silica Sand
18 FT.

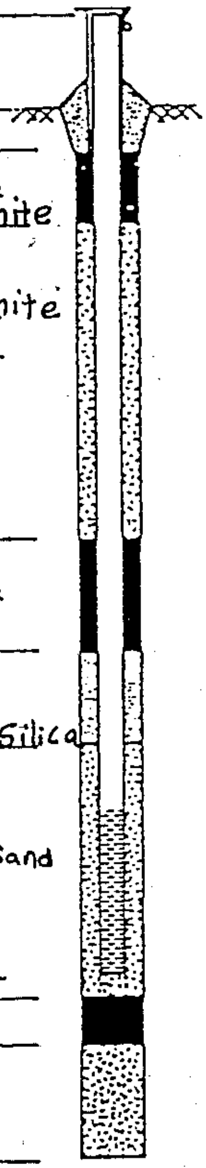
FILTER PACK MATERIAL
Coarse Silica Sand
20 FT.

WELL SCREEN LENGTH 10 FT.

WELL BOTTOM ELEV. ______
30 FT.
31 FT.

SEAL MATERIAL
NA
______ FT.

BACKFILL MATERIAL
NA
______ FT.



1) CASING DETAILS

A) TYPE OF PIPE:
PVC, STAINLESS, TEFLON, OTHER ______
PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;
COUPLINGS, THREADED (W/TAPE?), OTHER ______

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:
PVC, STAINLESS, TEFLON, OTHER ______

E) WELL SCREEN SLOT SIZE 0.010

F) PIPE DIA: ID IN. 2.0 OD IN. 2.3

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 4 IN.

2) WELL DEVELOPMENT

A) METHOD
BAILING, PUMPING, SURGING, COMPRESSED AIR
OTHER ______
(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 45 min.

C) APPROXIMATE WATER VOLUME: REMOVED 30 gal.
ADDED ______

D) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?
______ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):
DATE/TIME Static 22.1 FT.
DATE/TIME ______ FT.
DATE/TIME ______ FT.

ADDITIONAL COMMENTS: ______

FIGURE 11

RMT

American Steel Foundries

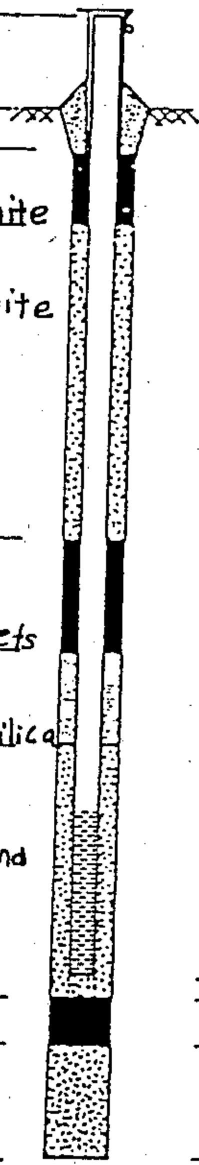
PROJECT NAME: Sebring Facility NO. 2169.17

WELL NO. MW-21P

DATE INSTALLED 11-24-93

ELEV. (T.O.C.) 1100.17

GROUND SURF. ELEV. 1097.7



DEPTH FROM GROUND SURFACE FT.

BENTONITE PELLETS/GRANULAR/POWDER

3/8" Holeplug Bentonite Chips — 3 FT.

BACKFILL MATERIAL

3/8" Holeplug Bentonite Chips

LENGTH OF SOLID PIPE

5 FT.

BACKFILL METHOD

PIPE TREMIE, AUGER TREMIE, GRAVITY FILLED

BOREHOLE DIA. 10 IN.

53 FT.

BENTONITE PELLETS/GRANULAR/POWDER

3/8" Bentonite Pellets — 56 FT.

SILICA SAND

Fine Colorado Silica Sand — 60 FT.

FILTER PACK MATERIAL — 60 FT.

Coarse Silica Sand

WELL SCREEN LENGTH FT.

WELL BOTTOM ELEV. — 65 FT.

65 FT.

SEAL MATERIAL

NA — FT.

BACKFILL MATERIAL

NA — FT.

1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER

PIPE SCHEDULE 80

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (W/TAPE?), OTHER

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER

E) WELL SCREEN SLOT SIZE 0.010

F) PIPE DIA: ID IN. 2.0 OD IN. 2.3

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 4 IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 20 min.

C) APPROXIMATE WATER VOLUME: REMOVED 10 gal.

ADDED

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME Static 22.1 FT.

DATE/TIME FT.

DATE/TIME FT.

ADDITIONAL COMMENTS:

FIGURE 12

RMI
Well F-17 (R 11-85)

American Steel Foundries

PROJECT NAME: Sebring Facility NO. 2169.17

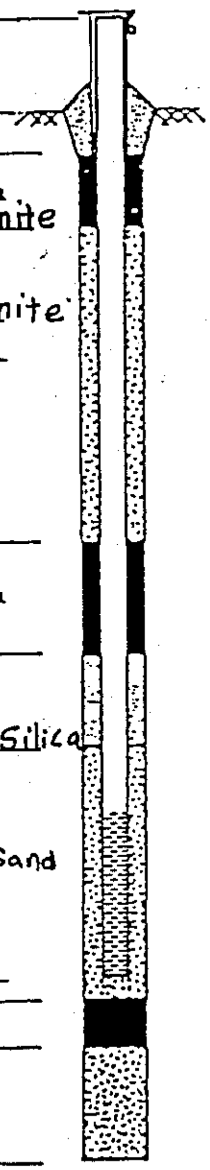
WELL NO. MW-22

DATE INSTALLED 11-11-93

ELEV. (T.O.C.) 1091.01

GROUND SURF. ELEV. 1088.5

DEPTH FROM GROUND SURFACE 0 FT.



BENTONITE PELLETS/GRANULAR/POWDER
3/8" Holeplug Bentonite Chips — NA FT.

BACKFILL MATERIAL
3/8" Holeplug Bentonite Chips

LENGTH OF SOLID PIPE 4.5 FT.

BACKFILL METHOD
PIPE TREMIE/AUGER TREMIE
GRAVITY FILLED

BOREHOLE DIA. 10 IN.

NA FT.

BENTONITE PELLETS/GRANULAR/POWDER
SAA — 6 FT.

SILICA SAND
Fine Colorado Silica Sand — 8 FT.

FILTER PACK MATERIAL — 10 FT.
Coarse Silica Sand

WELL SCREEN LENGTH 0 FT.

WELL BOTTOM ELEV. — 20 FT. / 20 FT.

SEAL MATERIAL
NA — FT.

BACKFILL MATERIAL
NA — FT.

1) CASING DETAILS

A) TYPE OF PIPE:
PVC, STAINLESS, TEFLON, OTHER
PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS;
COUPLINGS, THREADED (W/TAPE?), OTHER

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:
PVC, STAINLESS, TEFLON, OTHER

E) WELL SCREEN SLOT SIZE 0.010

F) PIPE DIA: ID IN. 2.0 OD IN. 2.3

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 4 IN.

2) WELL DEVELOPMENT

A) METHOD
BAILING, PUMPING, SURGING, COMPRESSED AIR
OTHER
(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 35 min.

C) APPROXIMATE WATER VOLUME: REMOVED 5 gal.
ADDED

D) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?
FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):
DATE/TIME Static 13.4 FT.
DATE/TIME FT.
DATE/TIME FT.

ADDITIONAL COMMENTS:

RMT

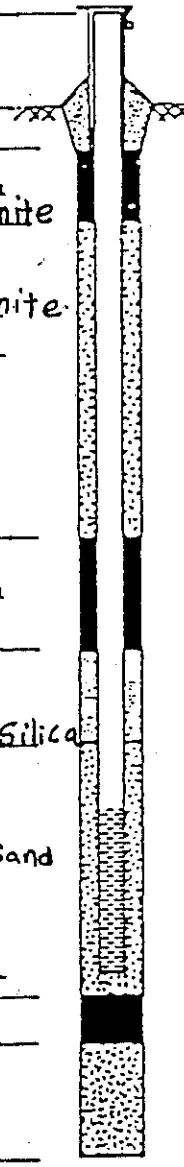
FIGURE 13

American Steel Foundries

PROJECT NAME: Sebring Facility NO. 2169.17

WELL NO. MW-22P

DATE INSTALLED 11-10-93



ELEV. (T.O.C.) 1091.23

GROUND SURF. ELEV. 1088.7

DEPTH FROM GROUND SURFACE

17 FT.

BENTONITE PELLETS/GRANULAR/POWDER

3/8" Holeplug Benlonite Chips — 6 FT.

BACKFILL MATERIAL

3/8" Holeplug Benlonite Chips Slurry

LENGTH OF SOLID PIPE 25 FT.

BACKFILL METHOD

PIPE TREMIE, AUGER TREMIE, GRAVITY FILLED

BOREHOLE DIA. 10 IN.

56 FT.

BENTONITE PELLETS/GRANULAR/POWDER

3/8" Pellets — 58 FT.

SILICA SAND

Fine Colorado Silica Sand — 58 FT.

FILTER PACK MATERIAL — 60 FT.

Coarse Silica Sand

WELL SCREEN LENGTH 5 FT.

WELL BOTTOM ELEV. ______ 65 FT. 65 FT.

SEAL MATERIAL NA ______ FT.

BACKFILL MATERIAL NA ______ FT.

1) CASING DETAILS

A) TYPE OF PIPE:

PVC, STAINLESS, TEFLON, OTHER ______

PIPE SCHEDULE 80

B) TYPE OF PIPE JOINTS;

COUPLINGS, THREADED (W/TAPE?), OTHER ______

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN:

PVC, STAINLESS, TEFLON, OTHER ______

E) WELL SCREEN SLOT SIZE 0.010

F) PIPE DIA: ID IN. 2.0 OD IN. 2.3

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO

PROTECTOR PIPE DIA. 4 IN.

2) WELL DEVELOPMENT

A) METHOD

BAILING, PUMPING, SURGING, COMPRESSED AIR

OTHER ______

(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 35 min.

C) APPROXIMATE WATER VOLUME: REMOVED 39gal.

ADDED ______

D) WATER CLARITY BEFORE DEVELOPMENT?

CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?

CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?

______ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):

DATE/TIME Static 15.7 FT

DATE/TIME ______ FT

DATE/TIME ______ FT

ADDITIONAL COMMENTS: ______

RMI

Well ...
F-17 (R 11-85)

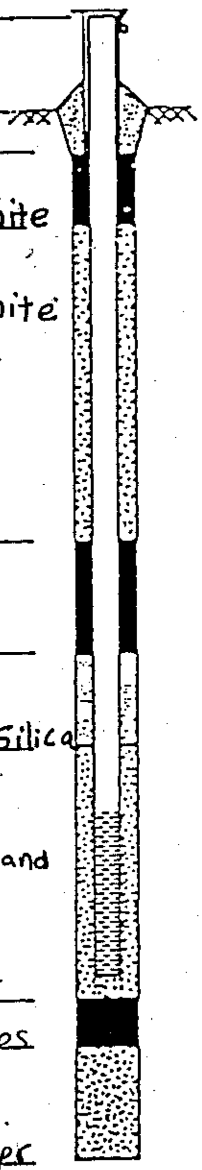
FIGURE 14

American Steel Foundries

PROJECT NAME: Sebring Facility NO. 2169.17

WELL NO. MW-23

DATE INSTALLED 11-23-93



ELEV. (T.O.C.) 1107.81

GROUND SURF. ELEV. 1105.3

DEPTH FROM GROUND SURFACE 0 FT.

BENTONITE PELLETS/GRANULAR/POWDER 3/8" Holeplug Bentonite Chips — NA FT.

BACKFILL MATERIAL 3/8" Holeplug Bentonite Chips

LENGTH OF SOLID PIPE 8.5 FT.

BACKFILL METHOD PIPE TREMIE/AUGER TREMIE GRAVITY FILLED

BOREHOLE DIA. 10 IN.

NA FT.

BENTONITE PELLETS/GRANULAR/POWDER SAA — 13 FT.

SILICA SAND Fine Colorado Silica Sand — 14 FT.

FILTER PACK MATERIAL Coarse Silica Sand — 16 FT.

WELL SCREEN LENGTH 10 FT.

WELL BOTTOM ELEV. ______ — 26 FT. / 27 FT.

SEAL MATERIAL 3/8" Holeplug Chips — 30 FT.

BACKFILL MATERIAL 3/8" Holeplug Chips — 35 FT.

1) CASING DETAILS

A) TYPE OF PIPE: PVC, STAINLESS, TEFLON, OTHER ______

PIPE SCHEDULE 40

B) TYPE OF PIPE JOINTS: COUPLINGS, THREADED (W/TAPE?), OTHER ______

C) WAS SOLVENT USED? YES OR NO

D) TYPE OF WELL SCREEN: PVC, STAINLESS, TEFLON, OTHER ______

E) WELL SCREEN SLOT SIZE 0.010

F) PIPE DIA: ID IN. 2.0 OD IN. 2.3

G) INSTALLED PROTECTOR PIPE W/LOCK? YES OR NO
PROTECTOR PIPE DIA. 4 IN.

2) WELL DEVELOPMENT

A) METHOD
BAILING, PUMPING, SURGING, COMPRESSED AIR
OTHER ______
(NOTE ADDITIONAL COMMENTS BELOW)

B) TIME SPENT FOR DEVELOPMENT? 35 min.

C) APPROXIMATE WATER VOLUME: REMOVED 18 gal.
ADDED ______

D) WATER CLARITY BEFORE DEVELOPMENT?
CLEAR, TURBID, OPAQUE

E) WATER CLARITY AFTER DEVELOPMENT?
CLEAR, SLIGHTLY TURBID, TURBID, OPAQUE

F) ODOR? YES OR NO

3) WATER LEVEL SUMMARY

A) DEPTH FROM TOP OF CASING AFTER DEVELOPMENT?
______ FT. OR DRY

B) OTHER MEASUREMENTS (T.O.C.):
DATE/TIME Static 18.5 FT
DATE/TIME ______ FT
DATE/TIME ______ FT

ADDITIONAL COMMENTS: ______

V. SAMPLING AND ANALYSIS PLAN AND PROCEDURES

Sampling and Analysis Plan Review

The ground water quality samples are being collected in accordance with the December 1994 Ground Water Sampling and Analysis Plan (GWSAP) prepared by RMT, Inc. The plan is kept on-site and was reviewed by the Ohio EPA as part of the CME. The GWSAP does not meet the requirements of OAC Rule 3745-65-92(A).

On April 13, 1992, the Ohio EPA received the March 1992 Ground Water Sampling and Analysis Plan (GWSAP). The GWSAP was submitted in accordance with the 1992 consent decree between the U.S. EPA and American Steel Foundries. The Ohio EPA received the GWSAP and identified one deficiency. On August 12, 1993, American Steel Foundries adequately addressed the deficiency and the Ohio EPA determined that the GWSAP met the requirements of OAC Rule 3745-65-92. The background ground water quality samples collected in December 1993, March 1994, June 1994 and September 1994 were collected in accordance with 1992 GWSAP.

On January 11, 1995, the Ohio EPA received the December 1994 revised GWSAP. The Ohio EPA has reviewed the revised GWSAP and determined that it does not meet the requirements of OAC Rule 3745-65-92. The Ohio EPA identified six deficiencies in the revised GWSAP. The GWSAP does not contain the forms for recording raw data and the exact location, time and facility specific considerations associated with the data acquisitions as required by OAC Rule 3745-65-92(A)(4)(a). The GWSAP does not specify the filter pore size as required by OAC Rule 3745-65-92(A)(4)(c). The Ohio EPA recommends the use of a 0.45 micron filter pore size. ASF has not proposed to collect a lab blank as required by OAC Rule 3745-65-92(A)(8)(a). At least one lab blank should accompany each sampling event. ASF has not proposed to collect a sufficient number of duplicate samples as required by OAC Rule 3745-65-92(A)(8)(b). The Ohio EPA recommends that ASF collect two duplicate samples per sampling event. The GWSAP does not contain the procedures and techniques for handling potential interferences as required by OAC Rule 3745-65-92(A)(8)(c). The GWSAP does not contain an example sample label(s) containing all information necessary for effective sample tracking as required by OAC Rule 3745-65-92(A)(9)(b).

Field Evaluation of Sampling and Analysis Procedures

The sampling of upgradient well, MW-14, was observed during the CME inspection. The sampling was performed by Kevin R. Kumrow and Brian Sedgwick of Roy F. Weston, Inc. Static water levels and total well depths were also measured for all the wells in the detection monitoring system on March 21, 1995.

The ground water samples were not collected according to the procedures and methods in the December 1994 GWSAP. Three deviations were observed: 1) A disposable teflon bailer was used for well purging and sample collection, instead of a pre-cleaned bailer. 2) The ground water quality samples for metals analysis were filtered through a disposable 0.45 micron filtering unit. They were not filtered using an in-line filtering system. 3) A plastic drop cloth was not placed on the ground surrounding the well during purging or sampling. During the sampling of MW-14, the sampling equipment did not come into contact with the ground and the samples were collected in a manner that ensured that representative samples were obtained. On March 22, 1995, Terry Bradway, Environmental Manager, American Steel Foundries, verbally informed the Ohio EPA that a plastic drop cloth was not used during the sampling of wells MW-19 and MW-14 and was used during the sampling of all subsequent wells. Ground water static water levels and total well depths were measured from the north side of the inner well casing. Six inner well casing have not been marked with a permanent reference measure point: MW-19, MW-24, MW-13P, MW-20, MW-24 and MW-25.

The Ohio EPA recommends that American Steel Foundries revise the GWSAP to state that they will 1) use disposable teflon bailers and 2) use disposable 0.45 micron filtering units. In addition, American Steel Foundries should use a plastic drop cloth during well purging and sampling.

VI. DETECTION MONITORING PROGRAM

Detection Monitoring Program Description

The ground water monitoring detection program was initiated in December 1993 with the collection of the first quarterly background ground water quality samples. The detection monitoring program was described in the March 1992 GWQAP and GWSAP. The GWQAP and GWSAP were approved by the Ohio EPA on October 13, 1993. The GWQAP is actually a plan for a detection monitoring system. The plans specified that American Steel Foundries would sample the ground water underlying the facility for water quality and indicator parameters, volatile organic compounds and Appendix IX metals (Table 3). The approved plans specified that after the collection and analysis of the first quarterly background samples the ground water sampling parameter list could be modified. Based upon the first quarter background ground water quality analytical results, the Ohio EPA approved American Steel Foundries' request to sample the ground water underlying the landfill for water quality and indicator parameters, selected Appendix IX metals which were detected above the Practical Quantitation Limits (PQLs) and the compounds found in American Steel Foundries' waste stream (Table 4).

Detection Monitoring Sampling Events

The four quarters of background ground water quality samples were collected in December 1993 and March, June and September 1994. The first semi-annual ground water sampling event took place on March 21 and 22, 1995. American Steel Foundries collected the samples according to the frequency in OAC Rules 3745-65-92(C) and (D).

Ground Water Quality Assessment Plan Outline

American Steel Foundries has not submitted a Ground Water quality Assessment Plan Outline (GWQAP Outline) to the Ohio EPA. American Steel Foundries has not prepared a GWQAP Outline as required by OAC Rule 3745-65-93(A). A GWQAP Outline was not on-site at the time of the CME inspection.

Ground Water Quality Analytical Results

The four quarters of background ground water quality sampling and analysis was completed as specified in GWSAP approved on October 13, 1993.

The results for the Drinking Water Quality Parameters did not exceed the Maximum Contaminant Levels specified in the Appendix to Rule 3745-65-92 of the Ohio Administrative Code. Static water levels were measured during each sampling event as specified by Rule 3745-65-92(E) or the Ohio Administrative Code.

TABLE 3

GROUND WATER SAMPLING AND ANALYSIS PARAMETER LIST FOR THE FIRST QUARTERLY BACKGROUND SAMPLING EVENT

WATER QUALITY INDICATOR PARAMETERS		
pH	fluoride	
carbonate alkalinity	manganese	
bicarbonate alkalinity	nitrate, nitrogen	
total organic carbon (TOC)	phenols	
total organic halogen (TOX)	sodium	
iron	specific conductance	
chloride	sulfate	
VOLATILE ORGANIC COMPOUNDS (VOCs)		
APPENDIX IX METALS		
antimony	copper	thallium
arsenic	lead	tin
barium	mercury	vanadium
beryllium	nickel	zinc
cadmium	selenium	cyanide (total)
chromium (total)	silver	sulfide (total)
cobalt		

TABLE 4

MODIFIED GROUND WATER SAMPLING AND ANALYSIS PARAMETER LIST BASED UPON THE RESULTS OF THE FIRST QUARTERLY BACKGROUND SAMPLING EVENT

WATER QUALITY INDICATOR PARAMETERS	
pH	fluoride[1]
carbonate alkalinity	manganese[1]
bicarbonate alkalinity	nitrate, nitrogen
total organic carbon (TOC)	phenols[1]
total organic halogen (TOX)	sodium
iron[1]	specific conductance
chloride[1]	sulfate[1]

APPENDIX IX METALS		
antimony	cobalt	selenium[1]
arsenic[1]	copper	silver1
barium[1]	lead[1]	tin
cadmium[1]	mercury[1]	zinc[1]
chromium (total)[1]	nickel[1]	sulfide (total)

COMPOUNDS IN WASTESTREAM		
arsenic	iron	nickel
barium	sulfate	phenol
cadmium	lead	selenium
chloride	manganese	silver
chromium	mercury	zinc
fluoride		

1 - compound or element is found in wastestream

The background ground water quality analytical results do not suggest a geochemical instability that may indicate the presence of an associated waste constituent within the uppermost aquifer system or an individual well. The ground water quality analytical results do not indicate the presence of any type of upgradient/downgradient trends or potential lab contamination.

Statistical Evaluations

In the December 1994 GWQAP, American Steel Foundries inappropriately statistically evaluated the background ground water quality analytical results. According to OAC Rule 3745-65-93(B), the initial statistical evaluation of the ground water quality analytical results should be performed on the analytical results of the first semi-annual sampling event.

American Steel Foundries completed the collection of the four quarters of background ground water quality sampling in September 1994. The first semi-annual sampling event occurred in March 1995. American Steel Foundries should conduct a statistical evaluation of the first semi-annual ground water quality analytical results upon their receipt.

VII. RECORDKEEPING AND REPORTING REQUIREMENTS

Recordkeeping and Reporting Requirements

American Steel Foundries is currently conducting detection monitoring. American Steel Foundries has met the requirements of OAC Rule 3745-65-94(A)(1).

Reporting Requirements

American Steel Foundries has not met the requirements of OAC Rule 3745-65-94(A)(2)(a). The analytical results of the initial four quarters of background ground water quality sampling were not submitted to Ohio EPA within fifteen days after completing each quarterly analysis.

American Steel Foundries did not submit Supplementary Annual Ground Water Monitoring Reports for 1990, 1991 or 1992 as required by OAC Rule 3745-65-75. The 1993 Supplementary Annual Ground Water Monitoring Report was received by the Ohio EPA on February 28, 1994. The 1994 Supplementary Annual Ground Water Monitoring Report was not received by March 1, 1995, as specified by OAC Rule 3745-65-75.

VIII. COMPLIANCE STATUS SUMMARY

As a result of this Comprehensive Ground Water Monitoring Evaluation, the following violations and deficiencies of Rules 3745-65-90 through 3745-65-94 and 3745-65-75(F) of the Ohio Administrative Code have been identified concerning the ground water monitoring program conducted at American Steel Foundries. Each violation and deficiency is cited below with explanation of occurrence provided. For additional information, the CME report text and the attached technical and regulatory checklists in Appendices A and A-1 should be consulted.

Violations

1. OAC RULE 3745-65-90(A)

   A. American Steel Foundries has not adequately 1) characterized the hydrogeology or 2) described the bedrock geology in the vicinity of the landfill as required by OAC Rule 3745-65-90.

      1) The hydrogeologic relationship between:
         a. the saturated mine spoil;
         b. the saturated upper sections of the Clarion Shale; and
         c. the deeper more competent sections of the Clarion Shale has not been adequately characterized.

      2) The competency of the Clarion Shale and how it effects the hydrogeologic regime at the landfill has not been adequately characterized.

      3) American Steel Foundries has not adequately characterized the relationship between nearby surface water bodies and the effects they have on the ground water underlying the facility.

      4) American Steel Foundries has not described the type, depth and thicknesses of the bedrock formations. The age and formal names of the formations have not been determined.

   B. American Steel Foundries has not correctly identified the uppermost aquifer. They consider the Clarion Shale to be the uppermost aquifer at the facility. The Ohio EPA considers the mine spoil and Clarion to be the uppermost aquifer. Both the mine spoil and upper portions of the Clarion Shale are saturated and saturated mine spoil sits directly upon the Clarion Shale at many locations surrounding the downgradient edge of the landfill. In addition, waste has been placed in direct contact with the mine spoil and Clarion Shale.

   C. The Ohio EPA is unable to determine if the detection ground water monitoring system is capable of determining the landfill's impact on the quality of ground water in the uppermost aquifer underlying the facility.

2. OAC Rule 3745-65-92(A)(4)(a)

   The December 1994 GWSAP does not contain the forms for recording raw data and the exact location, time and facility specific considerations associated with the data acquisitions as required by OAC Rule 3745-65-92(A)(4)(a)

3. OAC Rule 3745-65-92(A)(8)(a)

American Steel Foundries has not proposed to collect a laboratory blank as required by OAC Rule 3745-65-92(A)(8)(a). The Ohio EPA recommends that American Steel Foundries revise the December 1994 GWSAP to specify that one laboratory blank accompany each sampling event.

4. OAC Rule 3745-65-92(A)(8)(c)

The December 1994 GWSAP does not specify the procedures and techniques for handling potential interferences as required by OAC Rule 3745-65-92(A)(8)(c). The GWSAP should include a description of the laboratory procedures that will be used to correct sample matrix interferenes.

5. OAC Rule 3745-65-92(A)(9)(b)

The December 1994 GWSAP does not contain an example sample label(s) containing all information necessary for effective sample tracking as required by OAC Rule 3745-65-92(A)(9)(b)

6. OAC Rule 3745-65-93(A)

American Steel Foundries has not prepared a GWSAP Outline as required by OAC Rule 3745-65-93(A). The Ohio EPA recommends that American Steel Foundries prepare GWQAP Outline based upon the requirements as specified in Rule 3745-65-93(A) of the Ohio Administrative Code. The GWQAP Outline should be kept on-site.

7. OAC Rule 3745-65-94(A)(2)(a)

The analytical results of the four quarters of background ground water quality sampling were not submitted to Ohio EPA within fifteen days after completing each quarterly analysis as required by OAC Rule 3745-65-94(A)(2)(a).

8. OAC Rule 3745-65-75

A. American Steel Foundries did not submit Supplementary Annual Ground Water Monitoring Reports for 1990, 1991 or 1992 as required by OAC Rule 3745-65-75.

B. The 1994 Supplementary Annual Ground Water Monitoring Report was not received by March 1, 1995, as required by OAC Rule 3745-65-75.

DEFICIENCIES

1. The DDAGW is unable to determine if the four ground water monitoring wells installed in March 1995: MW-4B, MW-13P, MW-24 and MW-25, have been installed as described in the December 1994 Closure Plan. American Steel Foundries should submit the well construction information and well diagrams to the Ohio EPA.

2. The December 1994 GWSAP does not specify the filter pore size to be used during sample filtration. The Ohio EPA recommends the use of a 0.45 micron filter pore size. American Steel Foundries should revise the GWSAP to contain this information.

3. American Steel Foundries has not proposed to collect a sufficient number of duplicate samples. The Ohio EPA recommends that American Steel Foundries revise the December 1994 GWSAP to specify that two duplicate samples will be collected per sampling event. American Steel Foundries should revise the GWSAP to contain this information.

4. The following are observations noted during the CME site inspection regarding the maintenance of the monitoring wells at the facility:

    a. Permanent reference marks for the measurement of static water levels have not been marked on the inner casings of MW-19, MW-24, MW-13P, MW-20, MW-24 and MW-25.

    b. Three wells, MW-21, MW-21 and MW-25, are not properly labeled.

    c. The concrete pad surrounding MW-21P was covered and not visible. The Ohio EPA recommends that American Steel Foundries uncover the pad, inspect it and repair as needed.

    d. The Ohio EPA recommends that bumper guards be installed around those wells which will be located in high traffic areas.

5. The following are observations noted during the CME site inspection regarding the sampling procedures. Three deviations from the December 1994 GWSAP were observed:

    a. A disposable teflon bailer was used for well purging and sample collection, instead of pre-cleaned bailer. The Ohio EPA recommends that American Steel Foundries revise the GWSAP to include this information.

b. The GWSAP specified that the ground water quality samples for metals analysis would be filtered using an in-line filtering system. The samples were filtered through a disposable 0.45 micron filtering unit. The Ohio EPA recommends that American Steel Foundries revise the GWSAP to include this information.

c. A plastic drop cloth was not placed on the ground surrounding the well during purging or sampling. The Ohio EPA recommends that a plastic drop cloth be used during well purging and sampling.

6. American Steel Foundries has not supplied the Ohio EPA with a description of the methods and procedures used for the abandonment of MW-19P.

APPENDIX A

COMPREHENSIVE GROUND-WATER MONITORING EVALUATION WORKSHEET

The following worksheets have been designed to assist the enforcement officer/ technical reviewer in evaluating the ground-water monitoring system an owner/operator uses to collect and analyze samples of ground water. The focus of the worksheets is technical adequacy as it relates to obtaining and analyzing representative samples of ground water. The basis of the worksheets is the final RCRA Ground Water Monitoring Technical Enforcement Guidance Document which describes in detail the aspects of ground-water monitoring which EPA deems essential to meet the goals of RCRA. Appendix A is not a regulatory checklist. Specific technical deficiencies in the monitoring system can, however, be related to the regulations as illustrated in Figure 4.3 taken from the RCRA Ground-Water Monitoring Compliance Order Guide (COG) (included at the end of the appendix). The enforcement officer, in developing an enforcement order, should relate the technical assessment from the worksheets to the regulations using Figure 4.3 from the COG as a guide.

Comprehensive Ground-Water Monitoring Evaluation	Y/N
I. Office Evaluation Technical Evaluation of the Design of the Ground-Water Monitoring System A. Review of Relevant Documents 1. What documents were obtained prior to conducting the inspection: a. RCRA Part A permit application?	N
b. RCRA Part B permit application?	N
c. Correspondence between the owner/operator and appropriate agencies or citizen's groups?	Y
d. Previously conducted facility inspection reports?	Y
e. Facility's contractor reports?	Y
f. Regional hydrogeologic, geologic, or soil reports?	Y
g. The facility's Sampling and Analysis Plan?	Y
h. Ground-water Assessment Program Outline (or Plan, if the facility is in assessment monitoring)?	Y
i. Other (specify) ____________	

Y = YES
N = NO
N S = NOT SPECIFIED
* = COMMENT NUMBER

	Y/N
B. Evaluation of the Owner/Operator's Hydrogeologic Assessment 1. Did the owner/operator use the following direct techniques in the hydrogeologic assessment:	
a. Logs of the soil borings/rock corings (documented by a professional geologist, soil scientist, or geotechnical engineer)?	Y
b. Materials tests (e.g., grain-size analyses, standard penetration tests, etc.)?	Y
c. Piezometer installation for water level measurements at different depths?	Y
d. Slug tests?	N
e. Pump tests?	N
f. Geochemical analyses of soil samples?	N
g. Other (specify) (e.g., hydrochemical diagrams and wash analysis)	
2. Did the owner/operator use the following indirect techniques to supplement direct technique data:	
a. Geophysical well logs?	N
b. Tracer studies?	N
c. Resistivity and/or electromagnetic conductance?	N
d. Seismic Survey?	N
e. Hydraulic conductivity measurements of cores?	N
f. Aerial photography?	N
g. Ground penetrating radar?	N
h. Other (specify)	
3. Did the owner/operator document and present the raw data from the site hydrogeologic assessment?	Y
4. Did the owner/operator document methods (criteria) used to correlate and analyze the information?	Y
5. Did the owner/operator prepare the following:	
a. Narrative description of geology?	Y
b. Geologic cross sections?	Y
c. Geologic and soil maps?	N
d. Boring/coring logs?	Y
e. Structure contour maps of the differing water bearing zone and confining layers?	N
f. Narrative description and calculation of ground-water flows?	N

	Y/N
g. Water table/potentiometric map?	Y
h. Hydrologic cross sections?	N
6. Did the owner/operator obtain a regional map of the area and delineate the facility?	Y
If yes, does this map illustrate: a. Surficial geology features?	N
b. Streams, rivers, lakes, or wetlands near the facility?	Y
c. Discharging or recharging wells near the facility?	Y
7. Did the owner/operator obtain a regional hydrogeologic map?	N
If yes, does this hydrogeologic map indicate: a. Major areas of recharge/discharge?	N
b. Regional ground-water flow direction?	N
c. Potentiometric contours which are consistent with observed water level elevations?	N
8. Did the owner/operator prepare a facility site map?	Y
If yes, does the site map show: a. Regulated units of the facility (e.g., landfill areas, impoundments)?	Y
b. Any seeps, springs, streams, ponds, or wetlands?	Y
c. Location of monitoring wells, soil borings, or test pits?	Y * 1
d. How many regulated units does the facility have? ONE	
If more than one regulated unit then, • Does the waste management area encompass all regulated units?	
• Is a waste management area delineated for each regulated unit?	
C. Characterization of Subsurface Geology of Site 1. Soil boring/test pit program:	
a. Were the soil borings/test pits performed under the supervision of a qualified professional?	Y
b. Did the owner/operator provide documentation for selecting the spacing for borings?	Y
c. Were the borings drilled to the depth of the first confining unit below the uppermost zone of saturation or ten feet into bedrock?	N
d. Indicate the method(s) of drilling:	

	Y/N
Auger (hollow or solid stem) X Mud rotary ___ Reverse rotary ___ Cable tool ___ Jetting ___ Other (specify) air tool and water rotary	* 2
e. Were continuous sample corings taken?	N
f. How were the samples obtained (check method[s]) • Split spoon X • Shelby tube, or similar ___ • Rock coring X • Ditch sampling ___ • Other (explain) ___	
g. Were the continuous sample corings logged by a qualified professional in geology?	N.A.
h. Does the field boring log include the following information: • Hole name/number?	Y
• Date started and finished?	Y
• Driller's name?	Y
• Hole location (i.e., map and elevation)?	Y
• Drill rig type and bit/auger size?	N
• Gross petrography (e.g., rock type) of each geologic unit?	Y
• Gross mineralogy of each geologic unit?	Y
• Gross structural interpretation of each geologic unit and structural features (e.g., fractures, gouge material, solution channels, buried streams or valleys, identification of depositional material)?	Y
• Development of soil zones and vertical extent and description of soil type?	NA
• Depth of water bearing unit(s) and vertical extent of each?	Y
• Depth and reason for termination of borehole?	N
• Depth and location of any contaminant encountered in borehole?	Y
• Sample location/number?	Y
• Percent sample recovery?	Y
• Narrative descriptions of: —Geologic observations?	Y
—Drilling observations?	Y
i. Were the following analytical tests performed on the core samples: • Mineralogy (e.g., microscopic tests and x-ray diffraction)?	N
• Petrographic analysis: —degree of crystallinity and cementation of matrix?	N
—degree of sorting, size fraction (i.e., sieving), textural variations?	N
—rock type(s)?	N

	Y/N
—soil type?	N
—approximate bulk geochemistry?	N
—existence of microstructures that may effect or indicate fluid flow?	N
• Falling head tests?	N
• Static head tests?	N
• Settling measurements?	N
• Centrifuge tests?	N
• Column drawings?	N
D. Verification of Subsurface Geological Data	
1. Has the owner/operator used indirect geophysical methods to supplement geological conditions between borehole locations?	N
2. Do the number of borings and analytical data indicate that the confining layer displays a low enough permeability to impede the migration of contaminants to any stratigraphically lower water-bearing units?	N.S.
3. Is the confining layer laterally continuous across the entire site?	N.S.
4. Did the owner/operator consider the chemical compatibility of the site-specific waste types and the geologic materials of the confining layer?	N
5. Did the geologic assessment address or provide means for resolution of any information gaps of geologic data?	N
6. Do the laboratory data corroborate the field data for petrography?	Y
7. Do the laboratory data corroborate the field data for mineralogy and subsurface geochemistry?	Y
E. Presentation of Geologic Data	
1. Did the owner/operator present geologic cross sections of the site?	Y
2. Do cross sections:	
a. identify the types and characteristics of the geologic materials present?	Y
b. define the contact zones between different geologic materials?	N * 3
c. note the zones of high permeability or fracture?	N * 4
d. give detailed borehole information including:	

	Y/N
• location of borehole?	Y
• depth of termination?	Y
• location of screen (if applicable)?	Y
• depth of zone(s) of saturation?	N
• backfill procedure?	Y
3. Did the owner/operator provide a topographic map which was constructed by a licensed surveyor?	Y
4. Does the topographic map provide: a. contours at a maximum interval of two-feet?	Y
b. locations and illustrations of man-made features (e.g., parking lots, factory buildings, drainage ditches, storm drain, pipelines, etc.)?	Y
c. descriptions of nearby water bodies?	Y
d. descriptions of off-site wells?	Y
e. site boundaries?	Y
f. individual RCRA units?	Y
g. delineation of the waste management area(s)?	Y
h. well and boring locations?	Y
5. Did the owner/operator provide an aerial photograph depicting the site and adjacent off-site features?	N
6. Does the photograph clearly show surface water bodies, adjacent municipalities, and residences and are these clearly labelled?	N
F. Identification of Ground-Water Flowpaths 1. Ground-water flow direction a. Was the well casing height measured by a licensed surveyor to the nearest 0.01 foot?	Y
b. Were the well water level measurements taken within a 24 hour period?	Y
c. Were the well water level measurements taken to the nearest 0.01 foot?	Y
d. Were the well water levels allowed to stabilize after construction and development for a minimum of 24 hours prior to measurements?	Y
e. Was the water level information obtained from (check appropriate one): • multiple piezometers placed in single borehole? N • vertically nested piezometers in closely spaced separate boreholes? N • monitoring wells? Y	

	Y/N
f. Did the owner/operator provide construction details for the piezometers?	NA
g. How were the static water levels measured (check method[s]). • Electric water sounder Y • Wetted tape N • Air line N • Other (explain) ______	
h. Was the well water level measured in wells with equivalent screened intervals at an equivalent depth below the saturated zone?	Y
i. Has the owner/operator provided a site water table (potentiometric) contour map?	Y
If yes, • Do the potentiometric contours appear logical and accurate based on topography and presented data? (Consult water level data)	Y
• Are ground-water flow-lines indicated?	Y
• Are static water levels shown?	Y
• Can hydraulic gradients be estimated?	Y
j. Did the owner/operator develop hydrologic cross sections of the vertical flow component across the site using measurements from all wells?	N
k. Do the owner/operator's flow nets include: • piezometer locations?	N
• depth of screening?	N
• width of screening?	N
• measurements of water levels from all wells and piezometers?	N
2. Seasonal and temporal fluctuations in ground-water a. Do fluctuations in static water levels occur? If yes, are the fluctuations caused by any of the following:	Y
—Off-site well pumping	N
—Tidal processes or other intermittent natural variations (e.g., river stage, etc.)	N.S. *
—On-site well pumping	N
—Off-site, on-site construction or changing land use patterns	N
—Deep well injection	N
—Seasonal variations	Y
—Other (specify) ______	*
b. Has the owner/operator documented sources and patterns that contribute to or affect the ground-water patterns below the waste management area?	N
c. Do water level fluctuations alter the general ground-water gradients and flow directions?	N
d. Based on water level data, do any head differentials occur that may indicate a vertical flow component in the saturated zone?	Y

	Y/N
e. Did the owner/operator implement means for gauging long term effects on water movement that may result from on-site or off-site construction or changes in land-use patterns?	Y
3. Hydraulic conductivity a. How were hydraulic conductivities of the subsurface materials determined?	
• Single-well tests (slug tests)?	N
• Multiple-well tests (pump tests)	N
• Other (specify) ______	
b. If single-well tests were conducted, were they done by: • Adding or removing a known volume of water?	N.A.
• Pressurizing well casing?	N.A.
c. If single well tests were conducted in a highly permeable formation, were pressure transducers and high-speed recording equipment used to record the rapidly changing water levels?	N.A.
d. Since single well tests only measure hydraulic conductivity in a limited area, were enough tests run to ensure a representative measure of conductivity in each hydrogeologic unit?	Y
e. Are the owner/operator's slug test data (if applicable) consistent with existing geologic information (e.g., boring logs)?	N.A.
f. Were other hydraulic conductivity properties determined?	N
g. If yes, provide any of the following data, if available: • Transmissivity ____ • Storage coefficient ____ • Leakage ____ • Permeability ____ • Porosity ____ • Specific capacity ____ • Other (specify) ______	
4. Identification of the uppermost aquifer a. Has the extent of the uppermost saturated zone (aquifer) in the facility area been defined? If yes,	Y
• Are soil boring/test pit logs included?	Y
• Are geologic cross-sections included?	Y
b. Is there evidence of confining (competent, unfractured, continuous, and low permeability) layers beneath the site? If yes,	N
• how was continuity demonstrated? ______	NA
c. What is the hydraulic conductivity of the confining unit? (cm/sec.)	NA
d. How was it determined?	NA

	Y/N
e. Does potential for other hydraulic communication exist (e.g., lateral discontinuity between geologic units, facies changes, fracture zones, cross cutting structures, or chemical corrosion/alteration of geologic units by leachate)? If yes or no, what is the rationale? The area has been strip mined and hydraulic communication may occur along fracture that were caused by mining activities.	Y
G. Office Evaluation of the Facility's Ground-Water Monitoring System— Monitoring Well Design and Construction: These questions should be answered for each different well design present at the facility. 1. Drilling Methods a. What drilling method was used for the well? • Hollow-stem auger ☒ • Solid-stem auger ☐ • Mud rotary (water) ☒ • Air rotary ☒ • Reverse rotary ☐ • Cable tool ☐ • Jetting ☐ • Air drill w/ casing hammer ☐ • Other (specify) ____	*
b. Were any cutting fluids (including water) or additives used during drilling? If yes, specify: • Type of drilling fluid Water * 8 • Source of water used not specified • Foam ____ • Polymers ____ • Other ____	*
c. Was the cutting fluid, or additive, identified?	Y
d. Was the drilling equipment steam-cleaned prior to drilling the well? • Other methods ____	Y
e. Was compressed air used during drilling? If yes, • was the air filtered to remove oil?	N
f. Did the owner/operator document procedure for establishing the potentiometric surface? If yes, • how was the location established? Electric Sounder Tape	Y
g. Formation samples	

7

8

	Y/N
• Were formation samples collected initially during drilling?	N
• Were any cores taken continuously?	N
• If not, at what interval were samples taken?	N.S.
• How were the samples obtained? X Split spoon X Shelby tube X Core drill — Other (specify)	
• Identify if any physical and/or chemical tests were performed on the formation samples (specify) __________ __________ __________	
2. Monitoring Well Construction Materials a. Identify construction materials (by number) and diameters (ID/OD) Material / Diameter • Primary Casing — PVC — 2-inch ID • Secondary or outside casing (double construction) — Steel — 4 and 6 inch • Screen — PVC — 2-inch ID	
b. How are the sections of casing and screen connected? • Pipe sections threaded	Y
• Couplings (friction) with adhesive or solvent	N
• Couplings (friction) with retainer screws	N
• Other (specify)	
c. Were the materials steam-cleaned prior to installation? • If no, how were the materials cleaned? __________	Y
3. Well Intake Design and Well Development a. Was a well intake screen installed?	Y
• What is the length of the screen for the well? five and ten foot sections	*
• Is the screen manufactured?	Y
b. Was a filter pack installed?	Y
• What kind of filter pack was employed? sand	
• Is the filter pack compatible with formation materials?	Y
• How was the filter pack installed? __________	*

9

10

	Y/N	
• What are the dimensions of the filter pack? ____	*	11
• Has a turbidity measurement of the well water ever been made?	N	
• Have the filter pack and screen been designed for the in-situ materials? ____	Y	
c. Well development • Was the well developed?	Y	
• What technique was used for well development? —Surge block X Bailer —Air surging —Water pumping —Other (specify) ____		
4. Annular Space Seals a. What is the annular space in the saturated zone directly above the filter pack filled with: X Sodium bentonite (specify type and grit) —Cement (specify neat or concrete) —Other (specify)	*	1
b. Was the seal installed by: —Dropping material down the hole and tamping —Dropping material down the inside of hollow-stem auger —Tremie pipe method —Other (specify)		
c. Was a different seal used in the unsaturated zone? If yes,	Y	
• Was this seal made with? —Sodium bentonite (specify type and grit) —Cement (specify neat or concrete)- Other (specify)		
• Was this seal installed by? —Dropping material down the hole and tamping —Dropping material down the inside of hollow stem auger —Other (specify)		
d. Is the upper portion of the borehole sealed with a concrete cap to prevent infiltration from the surface?	Y	
e. Is the well fitted with an above-ground protective device and bumper guards?	Y*	1
f. Has the protective cover been installed with locks to prevent tampering?	Y	

	Y/N	
H. Evaluation of the Facility's Detection Monitoring Program		
1. Placement of Downgradient Detection Monitoring Wells		
a. Are the ground-water monitoring wells or clusters located immediately adjacent to the waste management area?	Y *	14
b. How far apart are the detection monitoring wells? 125-200 feet on average		
c. Does the owner/operator provide a rationale for the location of each monitoring well or cluster?	Y	
d. Does the owner/operator identify the well screen lengths of each monitoring well or cluster?	Y	
e. Does the owner/operator provide an explanation for the well screen lengths of each monitoring well or cluster?	N	
f. Do the actual locations of monitoring wells or clusters correspond to those identified by the owner/operator?	N *	15
2. Placement of Upgradient Monitoring Wells		
a. Has the owner/operator documented the location of each upgradient monitoring well or cluster?	Y	
b. Does the owner/operator provide an explanation for the location(s) of the upgradient monitoring wells?	Y	
c. What length screen has the owner/operator employed in the background monitoring well(s)?	*	16
d. Does the owner/operator provide an explanation for the screen length(s) chosen?	N	
e. Does the actual location of each background monitoring well or cluster correspond to that identified by the owner/operator?	Y	
I. Office Evaluation of the Facility's Assessment Monitoring Program		
1. Does the assessment plan specify:		
a. The number, location, and depth of wells?	NA *	17
b. The rationale for their placement and identify the basis that will be used to select subsequent sampling locations and depths in later assessment phases?	NA	
2. Does the list of monitoring parameters include all hazardous waste constituents from the facility?	NA	

	Y/N
a. Does the water quality parameter list include other important indicators not classified as hazardous waste constituents?	NA
b. Does the owner/operator provide documentation for the listed wastes which are not included?	NA
3. Does the owner/operator's assessment plan specify the procedures to be used to determine the rate of constituent migration in the ground-water?	NA
4. Has the owner/operator specified a schedule of implementation in the assessment plan?	NA
5. Have the assessment monitoring objectives been clearly defined in the assessment plan?	NA
a. Does the plan include analysis and/or re-evaluation to determine if significant contamination has occurred in any of the detection monitoring wells?	NA
b. Does the plan provide for a comprehensive program of investigation to fully characterize the rate and extent of contaminant migration from the facility?	NA
c. Does the plan call for determining the concentrations of hazardous wastes and hazardous waste constituents in the ground water?	NA
d. Does the plan employ a quarterly monitoring program?	NA
6. Does the assessment plan identify the investigatory methods that will be used in the assessment phase?	NA
a. Is the role of each method in the evaluation fully described?	NA
b. Does the plan provide sufficient descriptions of the direct methods to be used?	NA
c. Does the plan provide sufficient descriptions of the indirect methods to be used?	NA
d. Will the method contribute to the further characterization of the contaminant movement?	NA
7. Are the investigatory techniques utilized in the assessment program based on direct methods?	NA
a. Does the assessment approach incorporate indirect methods to further support direct methods?	NA
b. Will the planned methods called for in the assessment approach ultimately meet performance standards for assessment monitoring?	NA
c. Are the procedures well defined?	NA
d. Does the approach provide for monitoring wells similar in design and construction as the detection monitoring wells?	NA

	Y/N
e. Does the approach employ taking samples during drilling or collecting core samples for further analysis?	NA
8. Are the indirect methods to be used based on reliable and accepted geophysical techniques?	NA
a. Are they capable of detecting subsurface changes resulting from contaminant migration at the site?	NA
b. Is the measurement at an appropriate level of sensitivity to detect ground-water quality changes at the site?	NA
c. Is the method appropriate considering the nature of the subsurface materials?	NA
d. Does the approach consider the limitations of these methods?	NA
e. Will the extent of contamination and constituent concentration be based on direct methods and sound engineering judgment? (Using indirect methods to substantiate the findings.)	NA
9. Does the assessment approach incorporate any mathematical modeling to predict contaminant movement?	NA
a. Will site specific measurements be utilized to accurately portray the subsurface?	NA
b. Will the derived data be reliable?	NA
c. Have the assumptions been identified?	NA
d. Have the physical and chemical properties of the site specific wastes and hazardous waste constituents been identified?	NA
J. Conclusions	
1. Subsurface geology	
a. Have sufficient data been collected to adequately define petrography and petrographic variation?	Y
b. Has the subsurface geochemistry been adequately defined?	Y
c. Was the boring/coring program adequate to define subsurface geologic variation?	Y
d. Was the owner/operator's narrative description complete and accurate in its interpretation of the data?	N * 18
e. Does the geologic assessment address or provide means to resolve any information gaps?	N
2. Ground-water flowpaths	
a. Did the owner/operator adequately establish the horizontal and vertical components of ground water flow?	N * 19

	Y/N	
b. Were appropriate methods used to establish ground-water flowpaths?	Y	
c. Did the owner/operator provide accurate documentation?	Y	
d. Are the potentiometric surface measurements valid?	Y	
e. Did the owner/operator adequately consider the seasonal and temporal effects on the ground-water?	Y	
f. Were sufficient hydraulic conductivity tests performed to document lateral and vertical variation in hydraulic conductivity in the entire hydrogeologic subsurface below the site?	N	
3. Uppermost Aquifer a. Did the owner/operator adequately define the upper-most aquifer?	N *	20
4. Monitoring Well Construction and Design a. Do the design and construction of the owner/operator's ground-water monitoring wells permit depth discrete ground-water samples to be taken?	Y *	21
b. Are the samples representative of ground-water quality?	Y *	22
c. Are the ground-water monitoring wells structurally stable?	Y	
d. Does the ground-water monitoring well's design and construction permit an accurate assessment of aquifer characteristics?	Y *	23
5. Detection Monitoring a. Downgradient Wells • Do the location, and screen lengths of the ground-water monitoring wells or clusters in the detection monitoring system allow the immediate detection of a release of hazardous waste or constituents from the hazardous waste management area to the uppermost aquifer?	N *	24
b. Upgradient Wells • Do the location and screen lengths of the upgradient (background) ground-water monitoring wells ensure the capability of collecting ground-water samples representative of upgradient (background) ground-water quality including any ambient heterogenous chemical characteristics?	Y	
6. Assessment Monitoring a. Has the owner/operator adequately characterized site hydrogeology to determine contaminant migration?	NA *	2
b. Is the detection monitoring system adequately designed and constructed to immediately detect any contaminant release?	Y	

	Y/N
c. Are the procedures used to make a first determination of contamination adequate?	Y
d. Is the assessment plan adequate to detect, characterize, and track contaminant migration?	NA
e. Will the assessment monitoring wells, given site hydrogeologic conditions, define the extent and concentration of contamination in the horizontal and vertical planes?	NA
f. Are the assessment monitoring wells adequately designed and constructed?	NA
g. Are the sampling and analysis procedures adequate to provide a true measurement of contamination?	NA
h. Do the procedures used for evaluation of assessment monitoring data result in determinations of the rate of migration, extent of migration, and hazardous constituent composition of the contaminant plume?	NA
i. Are the data collected at sufficient frequency and duration to adequately determine the rate of migration?	NA
j. Is the schedule of implementation adequate?	NA
k. Is the owner/operator's assessment monitoring plan adequate?	NA
• If the owner/operator had to implement his assessment monitoring plan was it implemented satisfactorily?	NA
II. Field Evaluation **A. Ground-Water Monitoring System** 1. Are the numbers, depths, and locations of monitoring wells in agreement with those reported in the facility's monitoring plan? (See Section 3.2.3.)	N * 26
B. Monitoring Well Construction 1. Identify construction material material diameter a. Primary Casing PVC b. Secondary or outside casing Steel	
2. Is the upper portion of the borehole sealed with concrete to prevent infiltration from the surface?	Y
3. Is the well fitted with an above-ground protective device?	Y
4. Is the protective cover fitted with locks to prevent tampering? If a facility utilizes more than a single well design, answer the above questions for each well design?	Y

	Y/N
III. Review of Sample Collection Procedures	
A. Measurement of Well Depths /Elevation	
1. Are measurements of both depth to standing water and depth to the bottom of the well made?	Y
2. Are measurements taken to the 0.01 foot?	Y
3. What device is used? Electric Sounding Tape	
4. Is there a reference point established by a licensed surveyor?	N *
5. Is the measuring equipment properly cleaned between well locations to prevent cross contamination?	Y
B. Detection of Immiscible Layers	
1. Are procedures used which will detect light phase immiscible layers?	N.A.
2. Are procedures used which will detect heavy phase immiscible layers?	N.A.
C. Sampling of Immiscible Layers	
1. Are the immiscible layers sampled separately prior to well evacuation?	N.A.
2. Do the procedures used minimize mixing with water soluble phases?	N.A.
D. Well Evacuation	
1. Are low yielding wells evacuated to dryness?	Y
2. Are high yielding wells evacuated so that at least three casing volumes are removed?	Y
3. What device is used to evacuate the wells? DISPOSABLE TEFLON BAILERS	
4. If any problems are encountered (e.g., equipment malfunction) are they noted in a field logbook?	Y

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	Y/N
E. Sample Withdrawal	
1. For low yielding wells, are samples for volatiles, pH, and oxidation/reduction potential drawn first after the well recovers?	Y
2. Are samples withdrawn with either flurocarbon/resins or stainless steel (316, 304 or 2205) sampling devices?	Y
3. Are sampling devices either bottom valve bailers or positive gas displacement bladder pumps?	Y
4. If bailers are used, is fluorocarbon/resin coated wire, single strand stainless steel wire, or monofilament used to raise and lower the bailer?	Y
5. If bladder pumps are used, are they operated in a continuous manner to prevent aeration of the sample?	N.A.
6. If bailers are used, are they lowered slowly to prevent degassing of the water?	Y
7. If bailers are used, are the contents transferred to the sample container in a way that minimizes agitation and aeration?	Y
8. Is care taken to avoid placing clean sampling equipment on the ground or other contaminated surfaces prior to insertion into the well?	Y
9. If dedicated sampling equipment is not used, is equipment disassembled and thoroughly cleaned between samples?	N.A.
10. If samples are for inorganic analysis, does the cleaning procedure include the following sequential steps: a. Nonphosphate detergent wash? b. Dilute acid rinse (HNO_3 or HCl)? c. Tap water rinse? d. Type II reagent grade water?	N.A.
11. If samples are for organic analysis, does the cleaning procedure include the following sequential steps:	N.A.
a. Nonphosphate detergent wash?	
b. Tap water rinse?	
c. Distilled/deionized water rinse?	
d. Acetone rinse?	
e. Pesticide-grade hexane rinse?	

	Y/N
12. Is sampling equipment thoroughly dry before use?	Y
13. Are equipment blanks taken to ensure that sample cross-contamination has not occurred?	N.A.
14. If volatile samples are taken with a positive gas displacement bladder pump, are pumping rates below 100 ml/min?	N.A.
F. In-situ or Field Analyses	
1. Are the following labile (chemically unstable) parameters determined in the field:	
a. pH?	Y
b. Temperature?	Y
c. Specific conductivity?	Y
d. Redox potential?	N
e. Chlorine?	N
f. Dissolved oxygen?	N
g. Turbidity?	N
h. Other (specify) ______	-
2. For in-situ determinations, are they made after well evacuation and sample removal?	Y
3. If sample is withdrawn from the well, is parameter measured from a split portion?	Y
4. Are monitoring equipment calibrated according to manufacturer's specifications and consistent with SW-846?	Y
5. Are the date, procedure, and maintenance for equipment calibration documented in the field logbook?	Y
IV. Review of Sample Preservation and Handling Procedures	
A. Sample Containers	
1. Are samples transferred from the sampling device directly to their compatible containers?	Y

	Y/N
2. Are sample containers for metals (inorganics) analyses polyethylene with polypropylene caps?	Y
3. Are sample containers for organics analysis glass bottles with fluorocarbonresin-lined caps?	N.A.
4. If glass bottles are used for metals samples are the caps fluorocarbonresin-lined?	N.A.
5. Are the sample containers for metal analyses cleaned using these sequential steps:	N.S.
a. Nonphosphate detergent wash?	
b. 1:1 nitric acid rinse?	
c. Tap water rinse?	
d. 1:1 hydrochloric acid rinse?	
e. Tap water rinse?	
f. Distilled/deionized water rinse?	
6. Are the sample containers for organic analyses cleaned using these sequential steps:	N.A.
a. Nonphosphate detergent/hot water wash?	
b. Tap water rinse?	
c. Distilled/deionized water rinse?	
d. Acetone rinse?	
e. Pesticide-grade hexane rinse?	
7. Are trip blanks used for each sample container type to verify cleanliness?	N
B. Sample Preservation Procedures	
1. Are samples for the following analyses cooled to 4°C:	
a. TOC?	N.A
b. TOX?	N.A
c. Chloride?	N.A.
d. Phenols?	Y
e. Sulfate?	Y
f. Nitrate?	Y
g. Coliform bacteria?	N.A.
h. Cyanide?	N.A.
i. Oil and grease?	N.A.
j. Hazardous constituents (261, Appendix VIII)	Y

	Y/N
2. Are samples for the following analyses field acidified to pH <2 with HNO_3: a. Iron?	Y
b. Manganese?	Y
c. Sodium?	Y
d. Total metals?	Y
e. Dissolved metals?	Y
f. Fluoride?	Y
g. Endrin?	N.A.
h. Lindane?	N.A.
i. Methoxychlor?	N.A.
j. Toxaphene?	N.A.
k. 2,4, D?	N.A.
l. 2,4,5 TP Silvex?	N.A.
m. Radium?	N.A.
n. Gross alpha?	N.A.
o. Gross beta?	N.A.
3. Are samples for the following analyses field acidified to pH <2 with H_2SO_4: a. Phenols?	Y
b. Oil and grease?	N.A.
4. Is the sample for TOC analysis field acidified to pH <2 with HCl?	N.A.
5. Is the sample for TOX analysis preserved with 1 ml of 1.1 M sodium sulfite?	N.A.
6. Is the sample for cyanide analysis preserved with NaOH to pH >12?	N.A.
C. Special Handling Considerations 1. Are organic samples handled without filtering?	N.A.
2. Are samples for volatile organics transfered to the appropriate vials to eliminate headspace over the sample?	N.A.
3. Are samples for metal analysis split into two portions?	N
4. Is the sample for dissolved metals filtered through a 0.45 micron filter?	Y
5. Is the second portion not filtered and analyzed for total metals?	N
6. Is one equipment blank prepared each day of ground-water sampling?	N.A.

	Y/N
V. Review of Chain-of-Custody Procedures	
A. Sample Labels	
1. Are sample labels used?	Y
2. Do they provide the following information:	
a. Sample identification number?	Y
b. Name of collector?	Y
c. Date and time of collection?	Y
d. Place of collection?	Y
e. Parameter(s) requested and preservatives used?	Y
3. Do they remain legible even if wet?	Y
B. Sample Seals	
1. Are sample seals placed on those containers to ensure samples are not altered?	Y
C. Field Logbook	
1. Is a field logbook maintained?	Y
2. Does it document the following:	
a. Purpose of sampling (e.g., detection or assessment)?	Y
b. Location of well(s)?	Y
c. Total depth of each well?	Y
d. Static water level depth and measurement technique?	Y
e. Presence of immiscible layers and detection method?	Y
f. Collection method for immiscible layers and sample identification numbers?	Y
g. Well evacuation procedures?	Y
h. Sample withdrawal procedure?	Y
i. Date and time of collection?	Y
j. Well sampling sequence?	Y
k. Types of sample containers and sample identification number(s)?	Y
l. Preservative(s) used?	Y
m. Parameters requested?	Y
n. Field analysis data and method(s)?	Y
o. Sample distribution and transporter?	Y
p. Field observations?	Y

	Y/N
—Unusual well recharge rates?	Y
—Equipment malfunction(s)?	Y
—Possible sample contamination?	Y
—Sampling rate?	Y
D. Chain-of-Custody Record	
1. Is a chain-of-custody record included with each sample?	Y
2. Does it document the following:	
a. Sample number?	Y
b. Signature of collector?	Y
c. Date and time of collection?	Y
d. Sample type?	Y
e. Station location?	Y
f. Number of containers?	Y
g. Parameters requested?	Y
h. Signatures of persons involved in chain-of-custody?	Y
i. Inclusive dates of custody?	Y
E. Sample Analysis Request Sheet	
1. Does a sample analysis request sheet accompany each sample?	Y
2. Does the request sheet document the following:	
a. Name of person receiving the sample?	Y
b. Date of sample receipt?	Y
c. Duplicates?	Y
d. Analysis to be performed?	Y
VI. Review of Quality Assurance/Quality Control	
A. Is the validity and reliability of the laboratory and field generated data ensured by a QA/QC program?	
B. Does the QA/QC program include:	
1. Documentation of any deviation from approved procedures?	N

	Y/N
2. Documentation of analytical results for:	
a. Blanks?	Y
b. Standards?	N
c. Duplicates?	Y
d. Spiked samples?	N
e. Detectable limits for each parameter being analyzed?	Y
C. Are approved statistical methods used?	N.A. * 28
D. Are QC samples used to correct data?	Y
E. Is all data critically examined to ensure it has been properly calculated and reported?	Y
VII. Surficial Well Inspection and Field Observation	
A. Are the wells adequately maintained?	N * 29
B. Are the monitoring wells protected and secure?	Y
C. Do the wells have surveyed casing elevations?	N * 30
D. Are the ground-water samples turbid?	N
E. Have all physical characteristics of the site been noted in the inspector's field notes (i.e., surface waters, topography, surface features)?	Y
F. Has a site sketch been prepared by the field inspector with scale, north arrow, location(s) of buildings, location(s) of regulated units, locations of monitoring wells, and a rough depiction of the site drainage pattern?	N

	Y/N
VIII. Conclusions	
A. Is the facility currently operating under the correct monitoring program according to the statistical analyses performed by the current operator?	Y
B. Does the ground-water monitoring system, as designed and operated, allow for detection or assessment of any possible ground-water contamination caused by the facility?	Y
C. Does the sampling and analysis procedure permit the owner/operator to detect and, where possible, assess the nature and extent of a release of hazardous constituents to ground water from the monitored hazardous waste management facility?	Y

COMMENTS ON APPENDIX A

1. Monitor wells: MW-4B, MW-13P, MW-21, MW-21P, MW-20, MW-24 and MW-25 are not properly located on the facility map. As part of closure activities, all monitor well locations will be surveyed.

2. The five borings completed in July 1985 were made using hollow stern augers. The five wells installed in August 1991 were advanced with augers. the five wells installed in August 1991 were advanced with augers until refusal and bedrock drillings was completed with an air rotary rig. The eight wells installed in November 1993 were advanced with hollow stern augers and clear water rotary drilling techniques.

3. American Steel Foundries has not adequately described the bedrock geology at the landfill as required by OAC Rule 3745-65-90. American Steel Foundries has not described the type, depth and thicknesses of the formations. The age and formal names of the deposits have not been determined.

4. American Steel Foundries has not adequately characterized the hydrogeology in the vicinity of landfill as required by OAC Rule 3745-65-90. The hydrogeologic relationship between 1) the saturated mine spoil: 2) the saturated upper sections of the Clarion Shale and 3) the deeper, more competent sections of the Clarion Shale. The competency of the Clarion Shale and how it effects the water bearing capabilities of the Clarion Shale has not been adequately characterized.

5. American Steel Foundries has not adequately characterized the relationship between nearby surface water bodies and the effect they have on the ground water underlying the facility.

6. See Comment 5.

7. See Comment 2.

8. See Comment 2

9. Five foot well screens were installed in two monitor wells: MW-21P and MW-22P. Ten foot well screens were installed in nine monitor wells: MW-1A, MW-12, MW-13, MW-14, MW-19, MW-20, MW-21, MW-22 and MW-23. The Ohio EPA has not received the construction details for the wells installed in March 1995.

10. The method of sand emplacement in: MW-1A, MW-12, MW-13, MW-14, MW-19, MW-20, MW-21, MW-21P, MW-22, MW-22P and MW-23 was not specified. The Ohio EPA has not received the procedures and methods used for a construction and completion of the wells installed in March 1995.

11. A five foot silica sand pack was placed above the top of the well screen in: MW-1A, MW-12, MW-13 and MW-14. In MW-21P, the filter pack does not extend above the top of the screen. The filter pack extends two feet above the top of the screen in: MW-19, MW-20, MW-21, MW-21P, MW-22, MW-22P and MW-23. The Ohio EPA has not received the dimensions of the filter packs for the wells installed in March 1995.

12. Bentonite pellets were used to form the annular seals in: MW-1A, MW-12, MW-13 and MW-14. SAA 3/8 inch holeplug bentonite chip were used to form the annular seals in: MW-19, MW-20, MW-

21, MW-22 and MW-23. The annular seals in: MW-21P and MW-22P are made of 3/8 inch bentonite pellets. The Ohio EPA has not received the information regarding the materials used during the installation of the wells completed in March 1995.

13. The Ohio EPA recommends that bumper guards be installed around those wells which will be located in high traffic areas during closure activities.

14. See Comment 1.

15. See Comment 1.

16. See Comment 9. The background ground water monitoring wells are: MW-1A, MW-14, MW-19 and MW-12.

17. The facility is currently conducting detection monitoring.

18. See Comments 3, 4 and 5.

19. See Comments 4 and 5.

20. See Comments 3, 4 and 5.

21. The Ohio EPA has not received the construction details for the wells installed in March 1995.

22. See Comment 21.

23. See Comment 21.

24. The limits of waste will be surveyed during closure activities, along with the location of all the wells. Upon receipt of a new facility map, the Ohio EPA will determine if the wells are properly located.

25. See Comment 17.

26. See Comment 1.

27. Permanent reference marks for the measurement of static water levels have not been marked on the inner casings of MW-19, MW-24, MW-13P, MW-20, MW-24 and MW-25.

28. The proposed method of statistical analysis has not been submitted to the Ohio EPA. the first semi-annual samples were collected in March 1995.

29. Three wells: MW-21, MW-21P and MW-15, are not properly labeled. The concrete pad surrounding MW-21P was covered and not visible. The Ohio EPA recommends that American Steel Foundries uncover the pad, inspect it and repair as needed. See Comment 13 and 27.

30. See Comment 21.

ATTACHMENT II A-1

APPENDIX A-1

FACILITY INSPECTION FORM FOR COMPLIANCE WITH INTERIM STATUS GROUND WATER MONITORING STANDARDS

APPENDIX A-1

FACILITY INSPECTION FORM FOR COMPLIANCE WITH INTERIM STATUS STANDARDS COVERING GROUND-WATER

Company: AMERICAN STEEL FOUNDRIES EPA I.D. Number: 017497587

Company Address: 1001 EAST BROADWAY P.O. Box 2060 ALLIANCE 44601

Company Contact/Official: TERRY BRADWAY Title: ENV. MANAGER

Date of Inspection: March 21, 1995

Inspector's Name: Eric R. Adams Branch/Organization: Ohio EPA-NEDO

Type of Facility: (check appropriately)	Y/N
a) surface impoundment	N
b) landfill	Y
c) land treatment facility	N
Ground Water Monitoring Program	
1. Has a ground water monitoring plan been submitted to the Director for facilities containing a surface impoundment, landfill, land treatment facility?	Y
2. Was the ground water monitoring plan reviewed prior to the site visit? If "No," explain.	Y
A. Was the ground water plan reviewed at the facility prior to the actual site inspection? If "No," explain.	Y
3. Has a ground water monitoring program (capable of determining the facility's impact on the quality of ground water in the uppermost aquifer underlying the facility) been implemented? 3745-65-90(A)	N
4. Has at least one monitoring well been installed in the uppermost aquifer hydraulically upgradient from the limit of the waste management area? 3745-65-91(A)(1)	Y
A. Are sufficient ground water samples from the uppermost aquifer, representative of background ground water quality and not affected by the facility, ensured by proper well 1) Number(s)?	Y
2) Location?	Y
3) Depth?	Y

Y = YES, N = NO, NA = NOT APPLICABLE
NS = NOT SPECIFIED, * = COMMENT

APPENDIX A-1	Y/N
7) Ground water sample analysis of all applicable constituents associated with the facility including: 3745-65-92(A)(7) a) Constituents? 3745-65-92(A)(7)(a)	Y
b) Analytical method and detection limit? 3745-65-92(A)(7)(b)	Y
c) Sample holding time? 3745-65-92(A)(7)(c)	Y
8) Quality assurance/quality control: a) Samples for field/lab/equipment blanks? 3745-65-92(A)(8)(a)	Y * 5
b) Duplicate samples? 3745-65-92(A)(8)(b)	Y * 6
c) Potential interferences? 3745-65-92(A)(8)(c)	Y * 7
9) Chain of custody procedures: a) Standardized field tracking reporting forms to establish sample custody for the field prior to and during shipping? 3745-65-92(A)(9)(a)	Y * 8
b) Sample labels containing all information necessary for effective sample tracking? 3745-65-92(A)(9)(b)	Y * 9
10. Have the required parameters in ground water samples been tested quarterly for the first year? 3745-65-92(B) and (C)(1)	Y
A. Are the ground water samples analyzed for the following: 1) Parameters characterizing the suitability of the ground water as a drinking supply? 3745-65-92 B(1)	Y
2) Parameters establishing ground water quality? 3745-65-92 B(2)	Y
3) Parameters used as indicators of ground water contamination? 3745-65-92 B(3)	Y
a) Are at least four replicate measurements obtained for each sample? 3745-65-92(C)(2)	N
b) Are provisions made to calculate the initial background arithmetic mean and variance of the respective parameter concentrations or values obtained from well(s) during the first year? 3745-65-92(C)(2)	N
B. For facilities which have complied with first year ground water sampling and analysis requirements: 1) Have samples been obtained and analyzed for the indicators of ground water quality at least annually? 3745-65-92(D)(1)	Y
2) Have samples been obtained and analyzed for the indicators of ground water contamination at least semi-annually? 3745-65-92(D)(2)	Y
C. Were ground water surface elevations determined at each monitoring well each time a sample was taken? 3745-65-92(E)	Y

Y = YES, N = NO, NA = NOT APPLICABLE
NS = NOT SPECIFIED, * = COMMENT

APPENDIX A-1	Y/N	
2) Separate identification of any significant differences from initial background found in upgradient wells? 3745-65-94(A)(2)(b)	N.A.	
3) Results of the evaluation of ground water surface elevations?	Y	
4) Was the Annual Report submitted by March 1 of the following year? 3745-65-75(F)	N *	10

COMMENTS ON APPENDIX A-1

1. The exact limits of waste placement will be determined and surveyed during closure activities.

2. Monitor wells: MW-4B, MW-13P, MW-21, MW-21P, MW-20, MW-24 and MW-25 are not properly located on the facility map. As part of activities, all monitor well locations will be surveyed.

3. Three deviations from the December 1994 GWSAP were observed during the CME inspection; 1) a disposable teflon bailer was used for well purging and sample collection instead of a pre-cleaned bailer; 2) the ground water quality samples for metals analysis were filtered through a disposable 0.45 micron filtering unit instead of an in-line filtering system and 3) a plastic drop cloth was not placed on the ground surrounding the well during purging or sampling.

4. The GWSAP does not specify the filter pore size. The Ohio EPA recommends the use of a 0.45 micron filter pore size.

5. American Steel Foundries has not proposed to collect a laboratory blank. At least one laboratory blank should accompany each sampling event.

6. American Steel Foundries has not proposed to collect a sufficient number of duplicate samples. The Ohio EPA recommends that two duplicate samples be collected during each sampling event.

7. The GWSAP does not contain the procedures and techniques for handling potential interferences.

8. The GWSAP does not contain the forms for recording raw data and the exact location, time and facility specific considerations associated with the data acquisitions.

9. The GWSAP does not contain an example sample label(s) containing all information necessary for effective sample tracking.

10. American Steel Foundries did not submit Supplementary Annual Ground Water Monitoring Reports for 1990, 1991 or 1992 as required by OAC Rule 3745-65-75. The 1994 Supplementary Annual Ground Water Monitoring Report was not received by March 1, 1995, as specified by OAC Rule 3745-65-95.

COMPREHENSIVE MONITORING EVALUATION

OF

AMERICAN STEEL FOUNDRY

Mahoning County, Ohio

ODH017497587

OHIO ENVIRONMENTAL PROTECTION AGENCY

June 21, 1988

American Steel Foundaries,
Mahoning County, Ohio.

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Mahoning County, Ohio.

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American Steel Foundry,
Mahoning County, Ohio.

I. GENERAL BACKGROUND INFORMATION

The purpose of this report is to document the results of a Comprehensive Ground-Water Monitoring Evaluation (CME) conducted at the American Steel Foundary facility in Smith Township, Mahoning County, Ohio. A CME is an extensive review of the ground-water monitoring program employed at a regulated facility. It is designed to evaluate facility compliance with the Resource Conservation and Recovery Act (RCRA) ground-water regulations contained in Title 40, Part 265, Subpart F of the Code of Federal Regulations and Ohio Administrative Codes 3745-65-90 through 3745-65-94.

SITE INSPECTION

A site inspection was performed at the facility on April 20, 1988 in conjunction with this ground-water monitoring evaluation. Present during the inspection was Mr. Charles Rudd, Manager of Quality and Environmental Affairs of American Steel Foundaries, Mr. Paul Limbach, Works Engineer at American Steel Foundry, Mr. Kevin Bonzo, Division of Solid and Hazardous Waste, Northeast District Office of the Ohio EPA, and this author Mr. Richard Freitas, Division of Ground Water, Northeast District Office of the Ohio EPA. The company hydrogeologic consultant, Bowser-Morner Associates, Inc., was not made available to discuss the details of the ground-water monitoring program at the facility.

SOURCES OF INFORMATION

This report is based upon an extensive review of files and documents available at the Northeast District Office of the Ohio Environmental Protection Agency. Regulatory file information on American Steel Foundry is maintained at the Ohio EPA Northeast District Office. Information contained within these files includes inspection reports, records of communication, internal memoranda and documentation from the US EPA. The following documents were utilized in the preparation of this report:

1) Regulatory/Correspondence files, American Steel Foundry, Division of Solid and Hazardous Wastes, NEDO-OEPA.

2) Report: <u>Water Resources of the Mahoning River Basin</u> by W.P. Cross, M.E. Schroeder, and S.E. Norris, US Geologic Survey Circ. 177, 1952, 57 pp.

3) Report: <u>Geology of Stark County</u>, by Richard M. Delong and George M. White, Ohio Dept. of Natural Resources Bull. 61, 1963.

4) Report: Geology and Ground-Water Resources of Portage County, Ohio, by John D. Winslow and George W. White, USGS Prof. Paper 511, 1966.

5) Report: Geology of Water in Ohio, by Wilber Stout, Karl Ver Steeg, and G.F. Lamb, ODNR Bull. 44, 1943.

6) Report: Soil Survey, Mahoning County, Ohio, US Dept. of Agriculture, 1971.

7) Report: Environmental Assessment of the American Steel Foundry Lake Park Drive Disposal Site, Alliance, Ohio, Bowser-Morner Consultants, Feb. 14, 1986.

8) Map: Ground-Water Resources of Mahoning County, by Katie Shafer Crowell, ODNR, 1979.

9) Map: Underground Water Resources, Mahoning River Basin (Upper Portion), by James W. Cummins, ODNR, 1960.

10) Map: The Hydrogeology of the Pottsville Formation in Northeastern Ohio, by Alan C. Sedam, USGS Hydrologic Investigations Atlas HA-494, 1973.

11) Map: US Geologic Survey 7.5 minute topographic map, Alliance, Ohio, 1978.

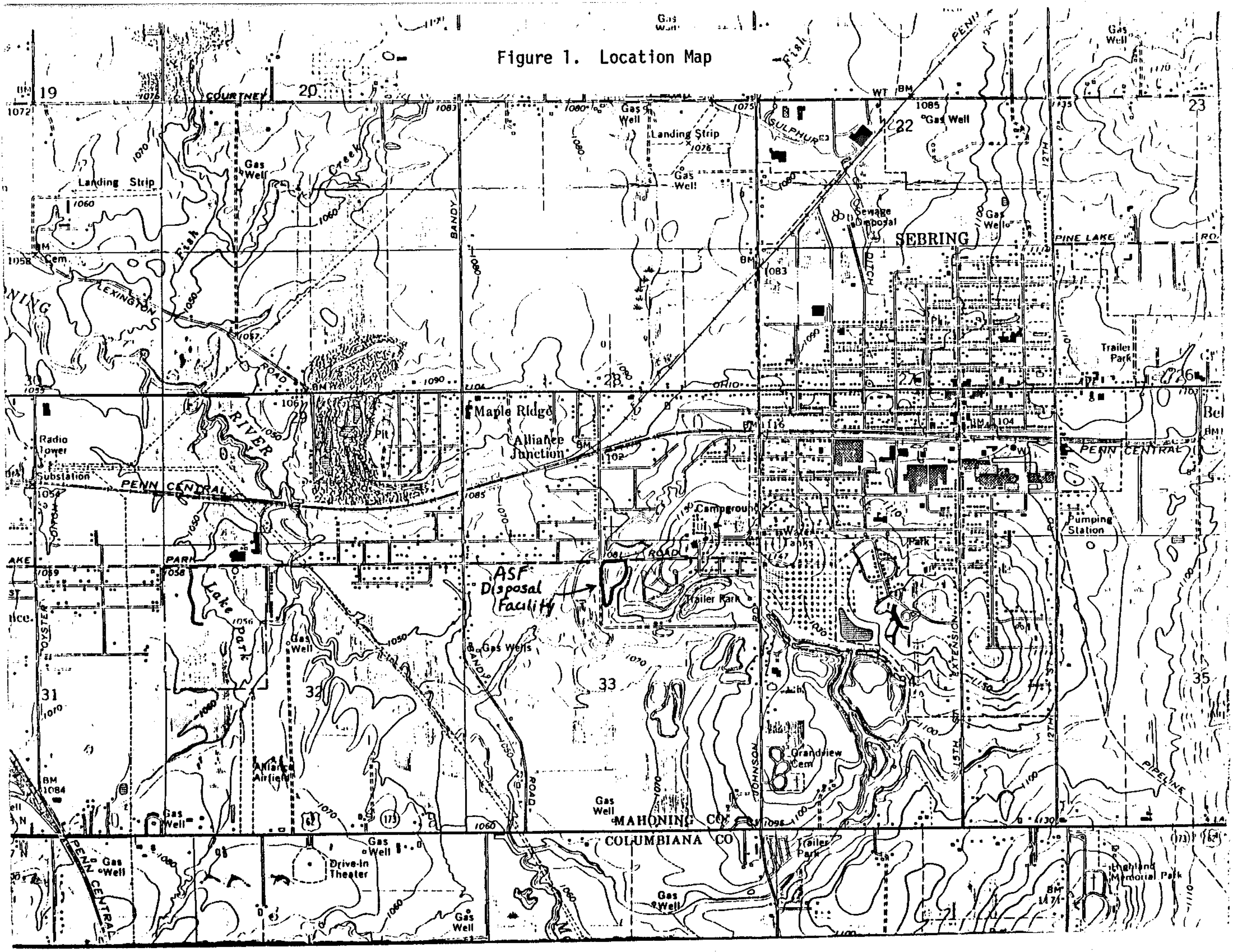
Facility Location, Operation and History

The American Steel Foundry (ASF) disposal facility is located at Lake Park Boulevard and Heacock Road in Smith Township, Mahoning County, Ohio near the City of Sebring. It can be located on the USGS Alliance, Ohio 7.5 minute topographic map at a latitude of 40 55'0"N and longitude 81 2'30"W, in the NE quarter of Section 33, Smith Township, Mahoning County (Figure 1). Formerly a coal strip mine, this property was purchased in 1966 by American Steel Foundry and in 1967, was approved by the Board of Health of the Mahoning County General Health District for the operation of an industrial waste disposal site.

Waste streams originally approved for disposal at this facility by the Mahoning County General Health District included open hearth slag, sand, dirt, silica sand and various types of brick and sand washer sludge. Throughout the 1970's, inspections conducted at the facility by the local health department and the Office of Land Pollution Control noted frequent occurrences of open dumping and disposal of unapproved material.

copy

Figure 1. Location Map



Pursuant to changes in the solid wastes laws of Ohio in March 1979, the Ohio EPA requested that American Steel Foundry submit plans for their disposal of solid wastes as defined by newly amended regulations and also to secure a Permit to Install for disposal of sludges. In May 1979, the Ohio EPA requested that ASF perform leachate tests on the slag and foundry sand to determine whether the material was exempt or regulated solid waste. In July 1979, ASF petitioned the Ohio EPA for a hearing on this matter. The request was dismissed by the Attorney General for lack of jurisdictional basis to conduct the hearing.

In August 1980, ASF filed a Notification of Hazardous Waste Activity for the disposal site. A Part A application was filed in November 1980 for landfill disposal of D006 waste (EP toxic for cadmium). In June 1982, ASF requested the USEPA to withdraw the Part A application based on their testing of the waste stream. The USEPA acknowledged this request in April 1983 based on information submitted by ASF.

In November 1984, the Ohio EPA conducted a hazardous waste inspection at the ASF production and disposal facility. The purpose of the inspection was to verify ASF's request for the withdrawal of their Part A application. At this time, the Ohio EPA requested that ASF split samples with the Ohio EPA on the foundry sand, electric arc furnace dust and sand washer sludge. Based on the Ohio EPA analytical results, the electric arc furnace dust was identified as a hazardous waste since it was EP toxic for cadmium. In April 1985, an inspection of the disposal facility was conducted to evaluate the compliance with applicable treatment, storage, and disposal regulations. The ASF disposal facility was found to be in violation of several applicable regulatory requirements and did not pursue compliance.

In November 1985, the Ohio EPA prepared a CERCLA Preliminary Assessment for this site. In response, ASF conducted an environmental assessment/impact study of the disposal site. This study included the installation of ground water monitoring wells. The report in its final form was completed in February 1986 and submitted to the Ohio EPA.

In August 1986, the USEPA conducted additional sampling of different waste streams at the facility. Results again indicated that wastes disposed at the Sebring facility were RCRA-regulated hazardous wastes based on EP toxicity criteria for cadmium and lead.

American Steel Foundry,
Mahoning County, Ohio.

In May 1987, the USEPA filed a civil action in the US District Court which cited numerous RCRA violations at the Sebring Township disposal facility. The general allegations include:

1) The disposal of hazardous waste without a permit and without interim status after June 25, 1982;

2) Failure to submit a Part B application or to certify compliance with ground water monitoring and financial responsibility requirements by November 11, 1985.

3) Continued disposal of hazardous waste beyond November 8, 1985.

4) Failure to submit adequate closure and post-closure plans after the loss of interim status.

The Ohio EPA conducted a RCRA inspection of this facility in August 1987. ASF claims that as of May 1987, they have ceased disposal of electric arc furnace dust at the Sebring facility. ASF continues to be in violation of applicable treatment, storage, and disposal regulations at this disposal facility.

II. REGIONAL GEOLOGY

The ASF facility is located in Mahoning County within the glaciated portion of the Allegheny Plateau physiographic province. The county soils report notes that several types of glacial drift of Wisconsin age are exposed at the surface (p. 115 Soil Survey of Mahoning County). Glaciers apparently had crossed the county before the Wisconsin glaciation because deposits of Illinoian and pre-Illinoian drifts are buried beneath the Wisconsin drift in Columbiana County to the south. The drifts of Wisconsin age were deposited during three substages of the Grand River lobe of the late Wisconsin glacial period (Figure 2). According to Bowser-Morner consultants, the surficial deposits southwest of the City of Sebring are mapped as ground moraine with large Kent end-moraine deposits lying approximately two miles to the southwest. The end moraine deposits apparently consist mainly of Lavery tills.

Bedrock apparently is overlain by only a thin veneer of glacial drift. In the vicinity of the City of Sebring, this drift averages less than 25 feet in thickness (Bull. 41, p. 438). Bedrock beneath the till consists of sedimentary rocks of the Pennsylvanian Age Allegheny and Pottsville Groups. A generalized section showing this sequence of rock strata in neighboring Stark County is shown as Figure 3. The sequence consists of alternating layers of thick and thin layers of sandstone and shale with thin lenses of limestone and coal. In Mahoning County, in the vicinity of the ASF facility, the bedrock layers dip generally to the southwest at an approximate grade of 1% (Bowser-Morner). Apparently no known buried valleys are present in the vicinity of the City of Sebring (p. 440, Bull. 41). However, along the general course of the Mahoning River there is evidence of an old valley floor (p. 574, Bull. 41). Valley fill in the vicinity of Alliance, approximately one mile west of the ASF disposal facility, serves as major aquifer in the region.

Groundwater Resources of Mahoning County

According to the Underground Water Resource Map (Cummins, 1960), all of the bedrock sandstone formations in Mahoning County yield adequate supplies of water for farm and suburban home use. The shale layers and limestone beds may yield moderate amounts. The unconsolidated deposits range from glacial clays on the surface which yield little or no water, to coarse, well-sorted gravel deposits, which when adjacent to a surface stream, may yield over 500 gallons per minute. Terrace gravels adjacent to the Mahoning River have yielded over 1,000 gallons per minute in several wells, however, the formation is not horizontally consistent for any considerable distance and extensive drilling is required to locate new supplies (Cummins, 1960). This same type of gravel deposit, located a distance from the river will not yield large quantities of water.

Figure 2.
Glacial Deposits of Northeast Ohio

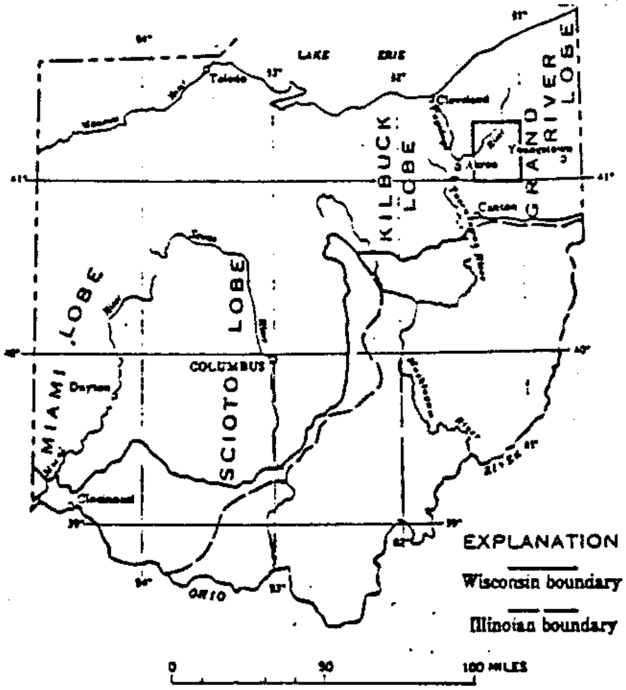


FIGURE 5.—Map of Ohio showing margins of glacial lobes.

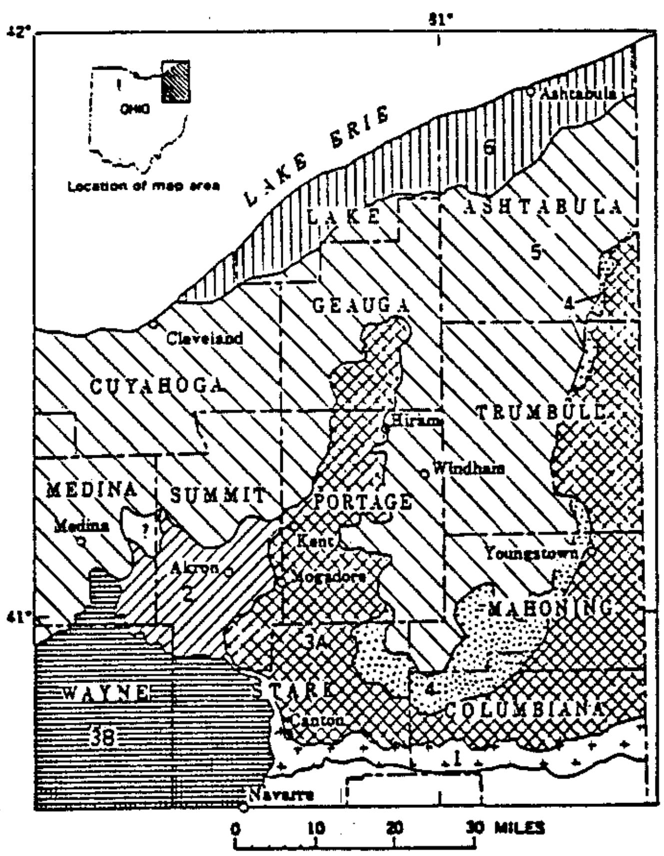
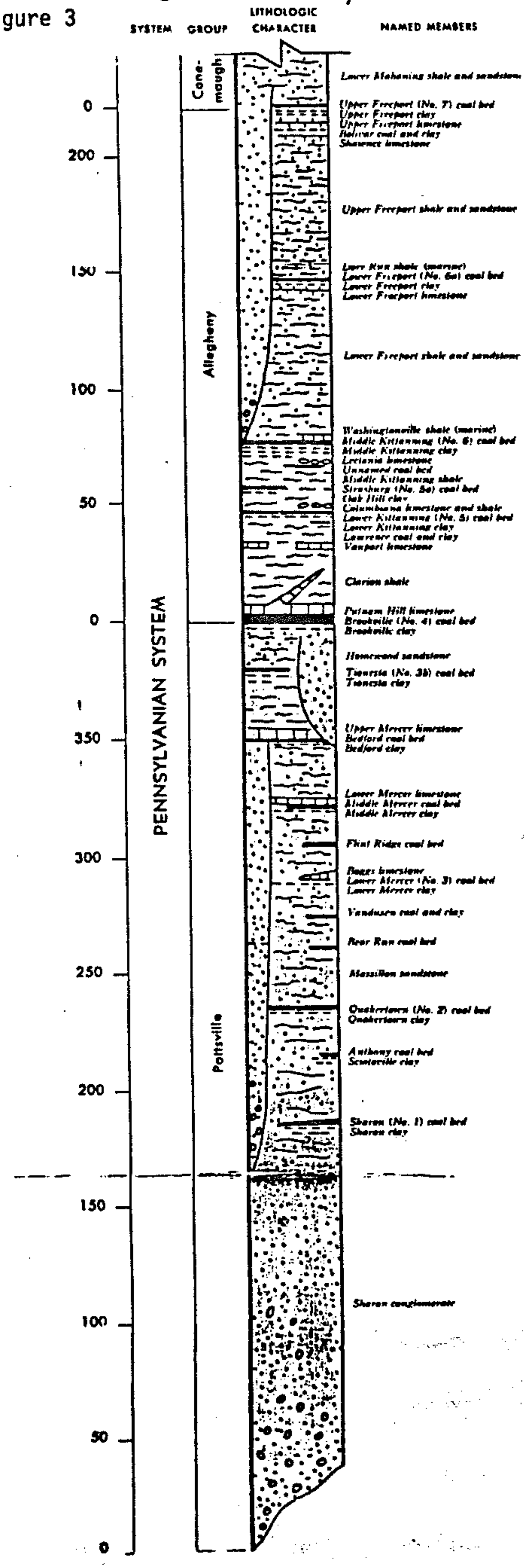


FIGURE 6.—Surface extent of Illinoian drift and Wisconsin rock-stratigraphic units in northeastern Ohio. 1. Illinoian drift; 2. Mogadore Till; 3A. Kent Till; 3B. pre-Hiram Till of Killbuck lobe; 4. Lavery Till; 5. Hiram Till; 6. Ashtabula Till. Modified from G. W. White (1960, fig. 1).

From, Geology and Ground-water Resources of Portage County, Ohio, Winslow/White, 1966.

GENERALIZED COLUMNAR SECTION
Stark County

Figure 3



Major bedrock aquifers in the county consist of the Clarion Shale Member of the Allegheny Group (Stout, 1943) and the Homewood, Connoquenessing and Sharon Members of the Pennsylvanian Pottsville Group (Sedam, 1973) as well as the Mississippian Berea Sandstone (Crowell, 1979).

Individual ground-water units are described within the following section.

Unconsolidated deposits

The disposal facility is adjacent to a valley-fill type aquifer. This aquifer lies between the disposal site and the City of Alliance along the general course of the Mahoning River. Near the disposal facility, the fill consists of isolated sand and gravel lenses in thick glacial outwash deposits (Crowell, 1979). These deposits may reach up to 100 feet in thickness. Yields in this portion of the fill are low generally ranging less than 10 gallons per minute. Wells not encountering sand and gravel in this area must be drilled into the underlying sandy shales to obtain ground water.

Where is the River

Further west, the valley fill aquifer becomes much more productive. About one-half mile west of the disposal facility, the valley fill consists of sand and gravel deposits ranging up to 200 feet in thickness (Crowell, 1979). Yields in this area generally range from 25 to 100 gallons per minute. Near Alliance, approximately one mile west of the facility, sustained yields of several hundred gallons per minute are achievable. Valley fill in this area consists of permeable sand and gravel deposits over 100 feet in thickness. Yields of up to 500 gallons per minute are achievable and this area represents the best ground water area of Mahoning County.

Consolidated Rock Aquifers

Berea Sandstone

Little information is available concerning the water bearing properties of the Berea Sandstone in Mahoning County. According to the Ground Water Resource Map of Mahoning County, this aquifer and the overlying Sharon Sandstone may supply significant amounts of water to isolated regions within the county. Total yield from composite wells penetrating the Sharon and Berea Sandstone in the county range from 25 to 100 gallons per minute. Greater yields of up to 200 gallons per minute may be available for intermittent periods of pumping. At Canfield in Central Mahoning County, these two sandstones yield over 200 gallons per minute to water wells.

Cuyahoga Group

In neighboring Portage County the Sharon sandstone is separated from the underlying Berea sandstone by the alternating sandstones and shales of the Cuyahoga Group. Little is written concerning the aquifer characteristics of this Group within Mahoning County. The rock strata of the Cuyahoga Group apparently do not represent major aquifers in this area and most wells are probably drilled through it into the underlying Berea Sandstone.

Pottsville Group

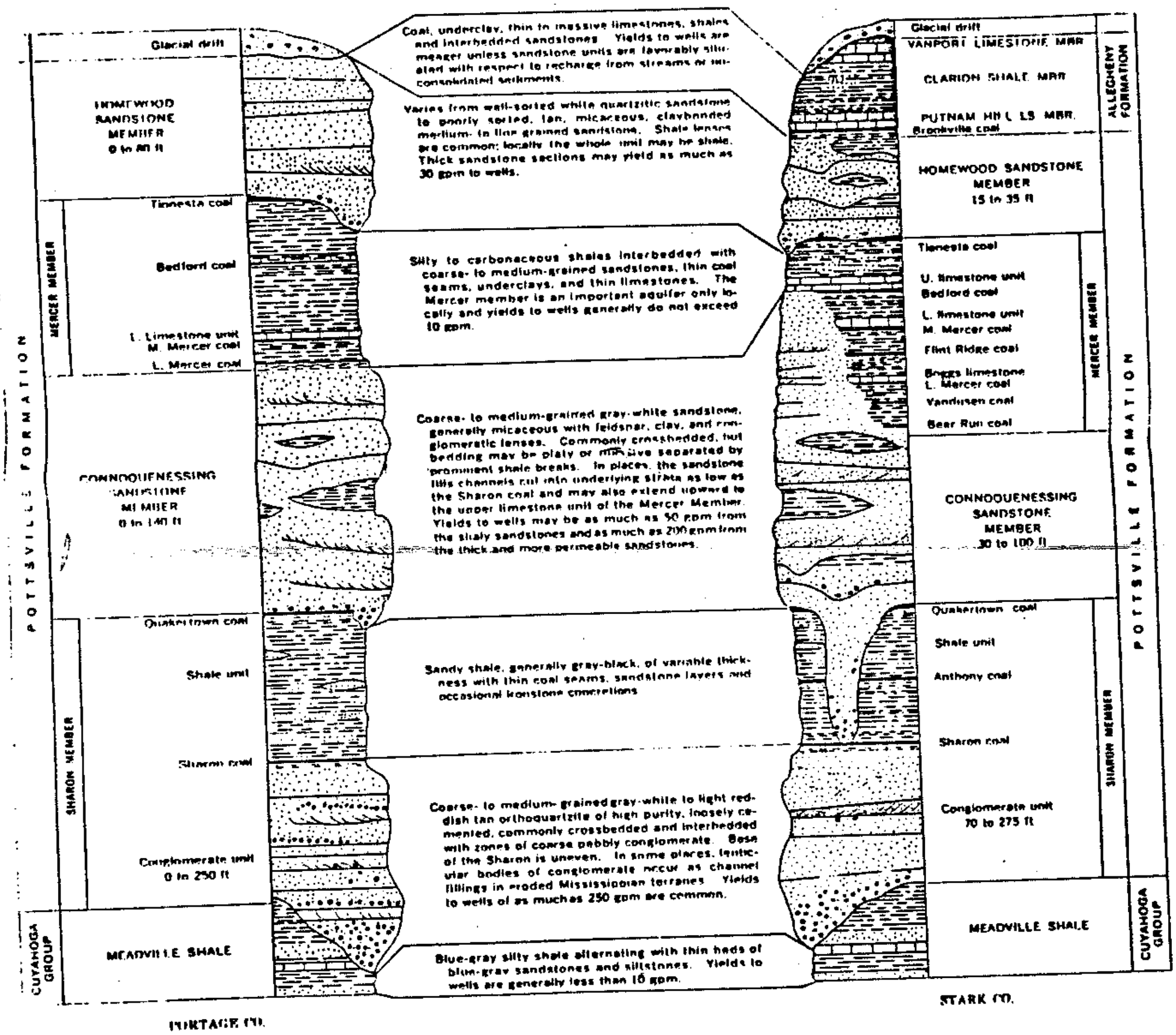
The principal aquifers of the Pottsville Group in Mahoning County include the Sharon, Connoquenessing and the Homewood Sandstone Members. A generalized columnar section showing each of these units is shown as Figure 4. Average transmissivity values for each aquifer in Mahoning County were calculated by Sedam, 1973, from specific capacity data derived from driller's logs using the graphical method developed by Theis, Brown, and Meyer (1963). Computed values vary over a wide range for each of the Pottsville aquifers chiefly because of variations in aquifer thickness. Even where the thickness and permeability are constant, differences in apparent transmissivity result from differences in depth of penetration of the wells, and the use of specific capacity data based on aquifers tests of varying duration. The following is a description of each member.

Sharon Member

Little information is available concerning the mineralogy/petrography of the Sharon Member in Mahoning County. The unit is well studied in adjacent Portage County to the northwest. The following information has been taken from the report, Geology and Ground-Water Resources of Portage County, by John D. Winslow, 1966.

> " The Sharon Member is a sandstone occurring at the base of the Pottsville Group lying unconformably on an erosion surface formed on the Cuyahoga Group early in Pennsylvanian time. The unconformity has a relief of up to 200 feet in Portage County which is reflected in the thickness of the Sharon Member. The conglomerate unit of the Sharon Member has a thickness of as much as 250 feet where it was deposited in a broad channel cut into the Mississippian rocks. In the marginal areas of the channel, located in the southeastern portion of Portage County, the conglomerate unit thins to about 20 feet and in places may be missing, owing to non-deposition on the uplands of the early Pennsylvanian erosion surface."

Figure 4. Generalized Geologic Sections showing the aquifers of the Pennsylvanian Pottsville Group



REPRESENTATIVE GENERALIZED SECTIONS

From Sedam, 1973 (Ref. 9).

" In Portage County, the Sharon Member consists of a thick sandstone having a basal quartz-pebble conglomerate in the channel areas. The sandstone is a porous, coarse-to-medium-grained orthoquartzite. The rock is friable because the conglomerate grains are weakly cemented by silica and iron oxide. The conglomerate consists of a mass of well-rounded quartz pebbles and granules commonly having little sand-sized matrix or cementing material. In places, chemical analysis of the rock show it to be as much as 99% silica dioxide with impurities being mainly iron oxide. Thin shale lenses occur in places within the upper part of the conglomerate unit. The conglomerate unit of the Sharon Member is irregular in distribution and thickness. Locally, in Portage and Stark Counties, the conglomerate unit may be as much as 250 feet thick, whereas in parts of Trumbull, Mahoning, and Wayne Counties the unit is missing altogether and only the shale unit of the Sharon Member is present. Where the sandstone is thin or shaly, wells generally yield less than 25 gpm and specific capacities are typically less than 1 gpm per foot of drawdown. "

" Overlying the Conglomerate unit of the Sharon Formation in Portage County is a shale member which underlies the Connoquenessing Sandstone Member of the Pottsville Group. The shale unit ranges from 0 to 90 feet in thickness . The shale is generally sandy and, in places, a thin shaly conglomerate occurs. Two coal units occur within the shale unit, the Sharon Coal and the Quakertown Coal. "

In Mahoning County, the Sharon member is over 200 feet in depth. Little information concerning the thickness or composition of the member in this County is available. The USGS hydrologic atlas (Sedam, 1973) list this aquifer as a fair to good source of water in the county with yields to wells averaging generally less than 10 gallons per minute. Transmissivity of this aquifer averages 2,400 gpd/ft in Mahoning County (Sedam, 1973).

Connoquenessing Member

The Connoquenessing Sandstone Member unconformably overlies the shale unit of the Sharon Member and underlies the Mercer Member. Information concerning the thickness of the unit in Mahoning County is unavailable. The following information has been taken from the report, Geology and Ground-Water Resources of Portage County, by John D. Winslow, 1966.

" In Portage County the Connoquenessing Sandstone ranges in thickness from 0 to 140 feet and is present in most of the county. It occurs as either a massive sandstone or as two sandstone units separated by as much as 50 feet of shale. Lithologically, the Connoquenessing is a coarse to medium grained sandstone. Generally, the member is micaceous and contains considerably more feldspar and clay than does the conglomerate unit of the Sharon Member. Commonly, the unit is crossbedded and the dip of the crossbeds ranges from southwest to northwest. The direction of the dip of the crossbeds is indicative of an easterly source area. In some areas of Portage County, the sandstone contains numerous rounded granules and pebbles of quartz, but these beds are never as extensive or as thick as the conglomerate beds of the Sharon Member."

In Mahoning County, the Connoquenessing lies at depths of less than 200 feet. It is the principal aquifer in the county where the Sharon is deeply buried or poorly developed. Transmissivity of the aquifer averages about 2,500 gpd/ft with specific capacities generally less than 1. It is a fair to good source of water with yields generally ranging from 10 to 25 gpm. Larger yields of up to 50 gpm are common and wells in the Canfield area of Mahoning County, yield up to 500 gallons per minute from this aquifer (Sedam, 1973).

Mercer Member

The Mercer Member of the Pottsville Group includes the shale, thin coal, underclay, limestone and sandstone units that lie above the Connoquenessing Sandstone Member and below the Homewood Sandstone Member of the Pottsville Formation. It is not considered a major aquifer in this county although it may yield small quantities of water to local wells.

Homewood Sandstone Member

Little information is available concerning the Homewood Sandstone in Mahoning County. In neighboring Portage County to the northwest, the Homewood is the uppermost unit of the Pottsville Group. The following information has been taken from the previously referenced report, Geology and Ground-Water Resources of Portage County, by John D. Winslow, 1966.

" The Homewood Sandstone Member unconformably overlies the Mercer Member of the Pottsville Group. The erosion surface that existed prior to the deposition of the Homewood Sandstone Member was in places cut deeply into the Mercer Member. The basal few feet of the Homewood Sandstone Member in the section is conglomerate consisting of nodular ironstone concretions and angular fragments of coal and shale eroded from the underlying Mercer Member. "

" The lithology of the Homewood ranges from a well-sorted coarse-grained white quartzose sandstone to a tan, poorly-sorted, clay-bonded micaceous medium to fine-grained sandstone. The thickness of the sandstone ranges from 0 to about 80 feet in Portage County. The full section is nowhere present in the county, owing to erosion in the late Tertiary time and glacial scour during the Pleistocene. In the south-central part of the county, a thin discontinuous shale unit is reported in the sandstone by drillers. The shale has a maximum thickness of about 30 feet. "

" The crossbedding has a considerable range in the general direction of dip. Generally, the dip of the crossbedding is southwestward with variations from northwest to southeast. The course of the channels in the Homewood Sandstone Member has not been observed in Portage County, however, an easterly source is most likely since the sandstone would not be expected to be in the Pennsylvanian basin to the south and west of the county. "

" In Mahoning County, the Homewood sandstone lies at less than 200 feet from the surface. It is overlain by the coal bearing strata of the Pennsylvanian Allegheny Group. It is a fair to good source of water with wells generally yielding in the range of 10 to 25 gpm. Where the sandstone is thick, yields of up to 30 gpm are available. "

An aquifer test of the Homewood near Lowellville in Mahoning County resulted in a transmissivity calculation of T= 19,000 gpd/ft, and storativity of S= 0.0002 for this area (Sedam, 1973). Generally, the transmissivity of this aquifer averages around 1,800 gpd/ft in Mahoning County with specific capacity generally less than one (Sedam, 1973). Hydraulic conductivities range from 5 to 200 gpd/sq-ft and are typically less than 100 gpd/sq-ft.

Allegheny Group

Principal aquifers of the Allegheny Group consist of alternating layers of thick and thin layers of sandstone and shale with thin lenses of limestone and coal. The principal aquifer within Mahoning County appears to be the Clarion Shale Member of the Pennsylvanian Allegheny Group (Stout, 1943). No information concerning the hydraulic properties of this aquifer in Mahoning County could be found.

A description of the Clarion shale may be found on page 51, Geology of Stark County, by Richard DeLong and George White. The following information is taken from this report.

> " The term Clarion is applied to a coal bed that closely underlies the Vanport Limestone, and to the sandstone between the Clarion Coal and Winters Coal. In the absence of these two coal beds, the Clarion Shale of Stark County occupies the interval between the Putnam Hill Limestone and the Vanport Limestone (Figure 3). This shale body extends upward to the Lower Kittanning underclay where the Vanport limestone is missing. "

> " Lithologically, the Clarion Shale is a soft, nonresistant rock that weathers extremely rapidly. Sandstone is usually absent from the section, but where present it is thin, fine-grained, and occurs close to the Lower Kittanning underclay, or the Vanport Limestone, if that member is present. In freshly cut highwalls, two types of shale are found, one a light bluish gray, the other buff to brown or pale olive-drab. Concretions are present in both types of shale however they are most numerous in the lower part of the unit. They may occur both as scattered nodules and as layers 1 to 2 inches thick separated by several inches of shale. The bluish-gray shale commonly makes up the lower part of the Clarion Shale. The shale is fissile or semi-fissle to thin, even-bedded, and slightly silty. A common feature of this unit is the presence of shale dikes. The dikes start a few feet above the Putnam Hill Member, continue upward, and die out a few feet below the Lower Kittanning underclay. Vertical jointing parallel to the edge of the dikes gives an appearance of false bedding. In some places these dikes are spaced as close as 25 to 30 feet. Their width is variable, with any one dike ranging from 1 to 3 feet in width. "

American Steel Foundaries,
Mahoning County, Ohio.

IV. SITE DESCRIPTION

Area Description/Surface Drainage

The American Steel Foundry Lake Park Disposal Site is located within an old strip-mine pit. Both the Middle Kittanning #6 and Lower Kittanning #5 coal beds were once strip-mined here in addition to the Lower Kittanning underclay and some of the softer shale beneath it. Previous site inspections at the facility by OEPA personnel have noted the presence of deep mines exposed along the highwall of the pit. How far these horizontal shafts extend is currently not known.

The areas immediately west and south of the site is the location of the now abandoned municipal landfill for the City of Sebring. The presence of this abandoned municipal disposal site represents a potential pollution source for ground-water. In addition, previous coal mining activities may have already adversely affected local ground-water quality in the area.

According to Bowser-Morner consultants, surface drainage from the site flows to the southwest, towards Edwinton Avenue and Heacock Coal Road across the old Sebring dump site and into a small tributary of the Mahoning River. The confluence of this tributary and the Mahoning River lies approximately 3,000 feet to the southwest of the site. Several water bodies exist near the site (Figure 5). These water bodies were apparently created by the earlier stripping operations at the site and may be described as follows:

1) "Pond No. 1" - A water body formed in an old strip-mine pit. It is located immediately north of the ASF disposal site on Lake Park Boulevard.

2) "Pond No. 2" - Located within the strip-pit/disposal area on the American Steel Foundry property. This water filled strip-pit represents the facility disposal area which is gradually being filled in by the addition of foundry slag, sand, sludge, and dust. The disposal of material within ground-water at this facility insures that the wastes will remain saturated which greatly increases the chance of leachate generation occurring here.

3) "Pond No. 3" - This water body lies immediately east of the ASF disposal pit and southwest of the Tecumseh Trailer Park which lies on the highwall of the former coal strip mine.

4) "Pond No. 4" - This water body is located immediately south of the ASF disposal "Pond No. 2 " and southwest of "Pond No. 3". This water body lies immediately south of the ASF property line along Edwinton Avenue and Heacock Roads. It is located within the old City of Sebring landfill.

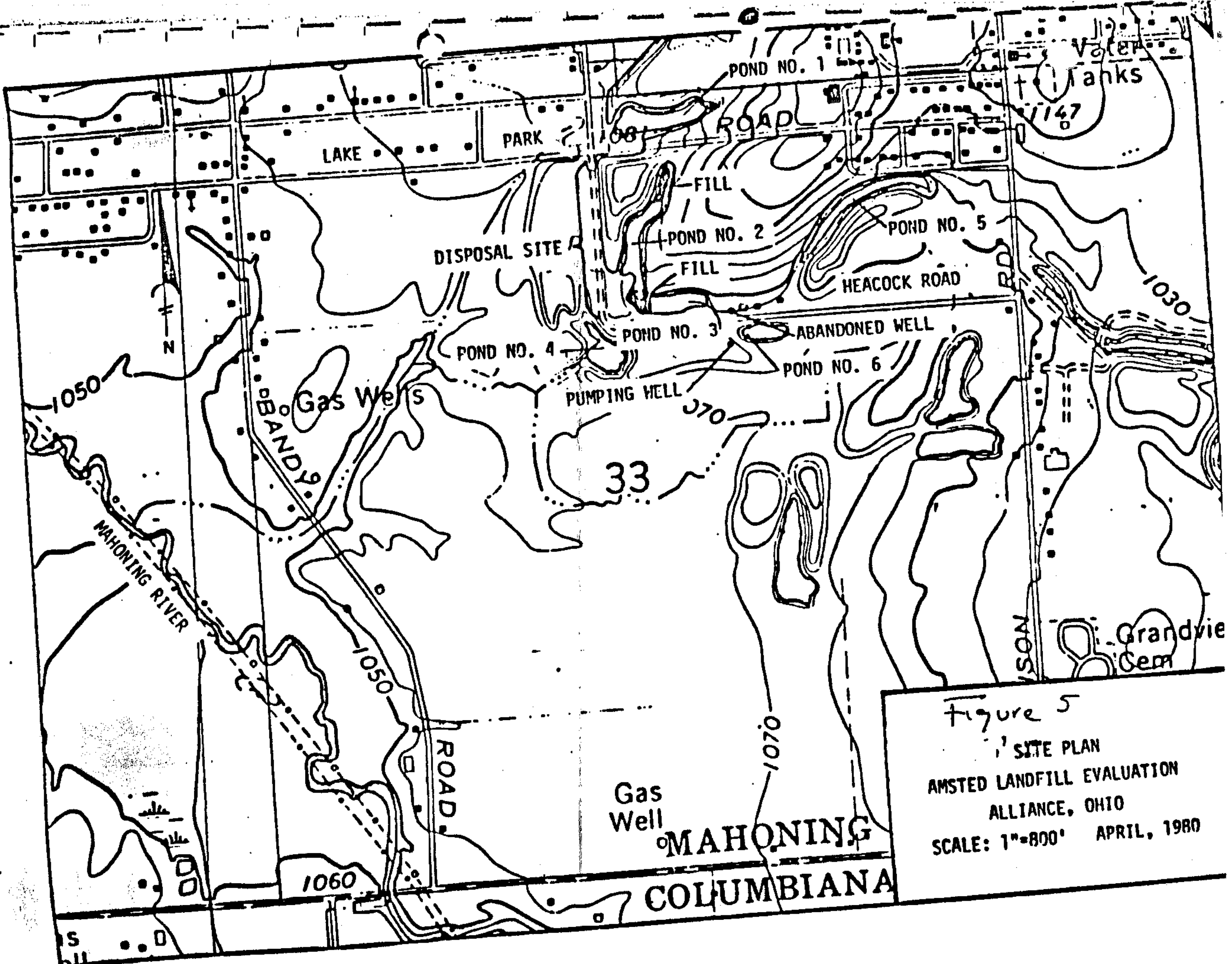


Figure 5

SITE PLAN
AMSTED LANDFILL EVALUATION
ALLIANCE, OHIO
SCALE: 1"=800' APRIL, 1980

Water within "Pond No. 4" was observed in a field inspection by this author on April 20, 1988. The waters within this "pond" were a bright reddish-orange color and appeared to be contaminated.

5) "Pond No. 5" - Located east of the ASF disposal site, southeast of the Tecumseh Trailer Park.

6) "Pond No. 6" - This water body lies south of Heacock Road, and southeast of "Pond No. 2" and "Pond No. 3".

Although not mentioned by the consultant, water contained within these ponds all appear to be hydraulically interconnected with and fed by ground-water. No surface water inlets or outlets to or from the ASF disposal pond #2 are apparent and previous site inspections by OEPA personnel have noted the presence of "springs" along the highwall of the pit/fill area. The presence of springs/seeps within the pit area indicates the ASF disposal "Pond #2" to be hydraulically interconnected with and fed by ground-water. Thus, it is apparent that refuse material is being deposited directly into the ground-waters present within the strip-pit area.

These "ponds" all appear to be hydraulically interconnected with each other via local ground-waters. The "ponds" all lie in close proximity to one another and all appear to have the same approximate surface water elevation. Static water levels during the initial drilling of wells #2, 3, 4, and 5 were estimated by the consultant to lie at an elevation of approximately 1,070 feet which is the same elevation as the surface waters in the American Steel Foundry site "Pond #2", the Tecumseh Trailer Park "Pond #3" and the Sebring landfill "Pond #4". The coincidence of static water level elevations within the wells with that of the surface ponds indicates that these "ponds" are hydraulically inter-connected with ground-water. Further evidence of this interconnection was noted in a site inspection at the facility by this author on April 20, 1988. During the inspection a rather large spring was discovered discharging south of the ASF "Pond #2" into "Pond #4 on the Old Sebring landfill. Waters in this spring had a reddish-orange color and were seen to be flowing through refuse buried at the landfill site. The source of the spring appeared to be ponds #2 and #3 to the north and indicate that "Ponds #2 and #3" are hydraulically interconnected with "Pond #4" via the subsurface ground-waters. From this information it appears that these two water bodies and possibly the other water bodies in the area as well are hydraulically interconnected via the ground-waters.

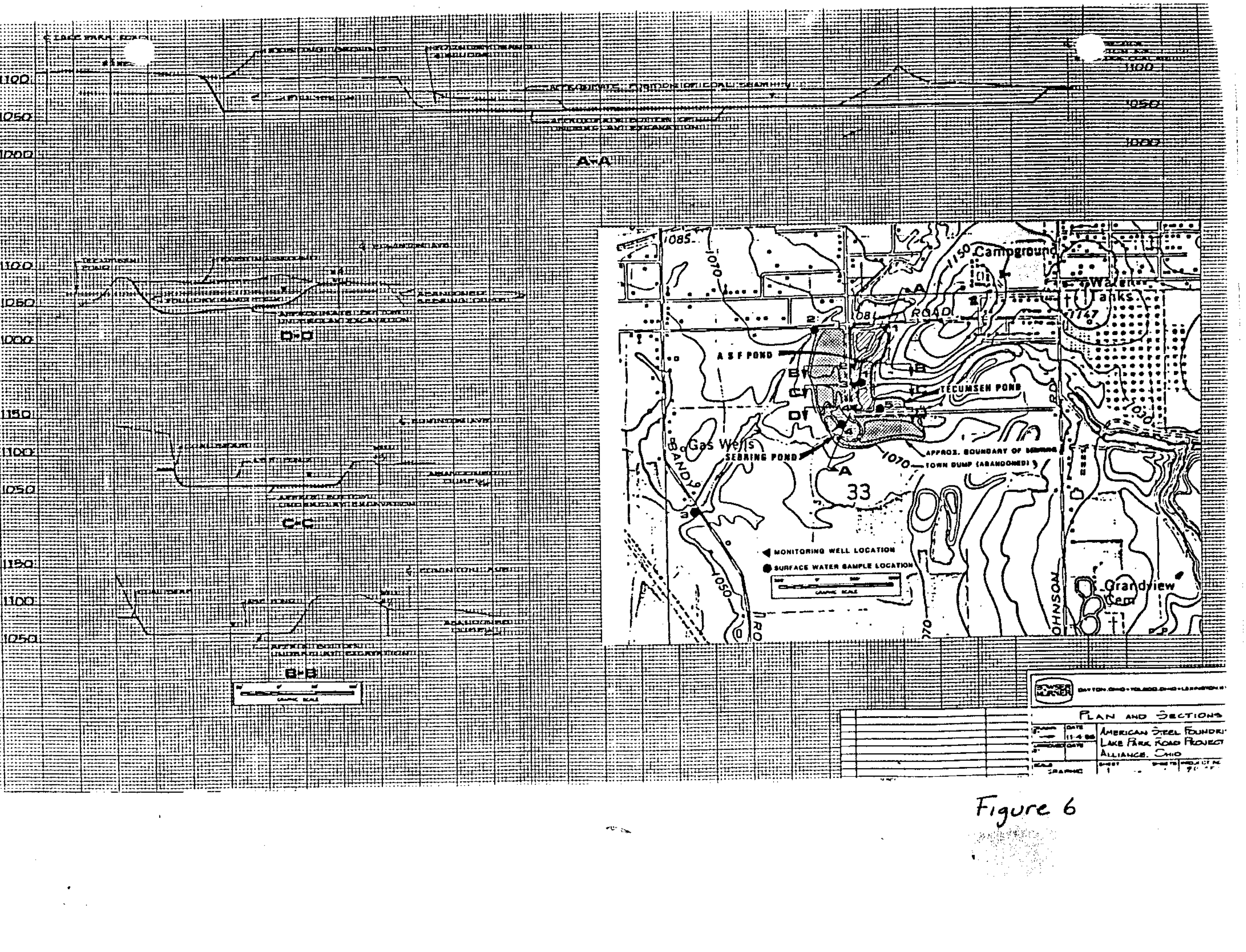
SITE GEOLOGY

The ASF facility is located within a strip-mine pit excavated into bedrock. No topographic contours were included on the facility site map and the physiography of the disposal facility is difficult to visualize except upon site inspection. A highwall exists at the site that at one time measured approximately 50 to 60 feet in height (Bowser-Morner). Apparently the Middle Kittanning #6 and Lower Kittanning #5 coal beds were strip mined previous to the mining of the Lower Kittanning underclay and some of the underlying soft shale. Thus, the section ranging from the Middle Kittanning coal bed down to an undetermined depth beneath the Lower Kittanning underclay has been excavated and probably exposed along the mine pit walls (Figure 3).

Very little information was provided by the consultant concerning the local geology/hydrogeology at the site. Of the five borings completed at the facility, only two were drilled to bedrock. Boring #5 was drilled through the fill in the mined-out pit area and encountered shale bedrock at the approximate elevation of 1,039 feet. Boring #1 at the northeast boundary of the strip pit, located upon the highwall approximately 80 feet above the pit floor at surface elevation of 1,117.7 feet, encountered weathered rock within the first ten feet of drilling and a coal bed at about 27.8 feet depth (1089.9 foot elevation). The coal bed had an apparent thickness of approximately one foot and was underlain by at least ten feet of clayshale which was highly weathered and very soft. This clayshale was considered by the consultant to be the Lower Kittanning underclay which was mined out in the strip-pit area. Beneath the underclay was an additional seventeen feet of shale to the bottom of the boring at 1,062.7 feet elevation. This shale may correspond to the Clarion shale which may be a local aquifer in the area. A "NX" core was taken to the bottom of the boring at a depth of fifty-five feet. The core sample consisted of siltstones interspersed with shale.

Geologic cross-sections provided by the consultant are shown as Figure 6. Although these sections show the approximate geometry of the filled pit area, they do not explicitly delineate the rock strata and potential aquifers exposed within the strip pit and thus provide only limited information. Screen intervals of the monitor wells should be included on these sections along with a clear indication of the the aquifer system being monitored.

A search of ODNR records by this author discovered a stratigraphic section that was measured at the site during a period of previous coal mining activity. This section is listed as Table 1. Since the time of coal mining at the site, the Lower Kittanning underclay and underlying soft shale have been removed as well. A driller's log from a test



A-A
D-D
C-C
B-B
ASF POND
TECUMSEH POND
SEBRING POND
Campground
Water Tanks
Gas Wells
Grandview Cem
BANDY
ROAD
33
APPROX. BOUNDARY OF SEBRING TOWN DUMP (ABANDONED)
MONITORING WELL LOCATION
SURFACE WATER SAMPLE LOCATION
GRAPHIC SCALE
PLAN AND SECTIONS
AMERICAN STEEL FOUNDRIES
LAKE PARK ROAD PROJECT
ALLIANCE, OHIO

Figure 6

Table 11. Measured Stratigraphic Section, ASF Strip Pit

Field No. ____________

Measured by J. Granchi

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF GEOLOGICAL SURVEY

Dr Aug. 11,1960

File No. 15058

County Mahoning

Township Smith

Section NC 33

Quad Alliance

x ____________

y ____________

Ref. ____________

STRATIGRAPHIC SECTION

Section measured in Active Strip mine just south of, and near Bandy Crossing Store N.C. Sec.33, Smith twp., Mahoning Co.

ASF strip pit

	Thickness Ft.	Thickness In.	Interval from base Ft.	Interval from base In.
			56	4
Sandstone and shale, alternating thin beds 2"-6" thin even bedded, fine grained. Veri-colored and mottled, green , gray, brown and olive drab on weathered surface, grayish brown and light tan on fresh break.	18	0	38	4
Sandstone, fine grained, massive, mottledlight gray, olivedrab and brown on weathered surface.	1	4	37	0
Shale, sandy, thin bedded, dense, olive drab and gray uneven bedding.	1	10	35	2
Sandstone, fine grained, massive, micaceous, profuse scattering of black speckles and blotches, light olive drab on fresh fracture, mottled olive drab and brown on weathered surface.	3	2	32	0
Shale, dull olive drab and gray thin even bedded.	1	5	30	7
Coal, bright, blocky, well cleated, medium banding, numerous paper-thin pyritepartings(sampled for spores study) Probably the Middle Kittanning coal!	2	9	27	10
Underclay, light gray, plastic contains some small weathered iron nodules andconcretions.	3	4	24	6
Underclay, nodular, buff to reddish brown, heavily stained, contains iron nodules and small concretions.	4	2	20	4
Underclay, light gray, plastic.	7	10	12	6
Siltstone, light olive drab and gray.	1	4	11	2
Shale, light gray, non-bedded, calcareons.	0	8	10	6
Clayshale, dark gray, dense uneven bedding.	4	0	6	6

7451
Field No.

Table 1. Con't.

File No. 15058

STRATIGRAPHIC SECTION

Page No. 2

	Thickness Ft.	Thickness In.	Interval from base Ft.	Interval from base In.
Clayshale, olive drab, thin even bedding, dense....	2	6	4	0
Roof shale, black, dense, thin evenbedding.........	0	10	3	2
Coal, flinty, bright, blocky, well cleatedthin to medium bands.(sampled for spores study)......	3	2	0	0

Probably the Lower Kittanning coal, (elevation 1,050 msL ?)

Table 2. Driller's logs for
Test boring near ASF facility

McKAY AND GOULD DRILLING, INC.

R.D. 2, Darlington, Pa. 16115

R.D. 2, Darlington, Pa. 16115

WATER SUPPLY

MAY 3 1978

For Tecumseh Village   Location Alliance

Date Fb. 5, 1973

Driller P Ortz

For Tecumsch Village   Location Alliance

Date Fb. 5, 1973

Driller P Ortz

Log of Test Hole No.

(2)

Log of Test Hole No.

Type of Formation	Ft.	In.
Top Soil	2	
Sand	2	
Sandstone	47	
Sandy Shale	7	
Sandstone	10	
Coal		42
Clay	7½	
Sandy shale	16	
Shale	11	
Coal		36
Clay	3	
Sandy shale	20	
Slate	17	
Coal		24
Clay	4	
Shale	24	
Coal		24
Clay	3	
Sandstone	6	
Shale	20	
Sandstone	15	

Type of Formation	Ft.	In.	Total Depth
Shale	54		
Sandstone	6		
Shale	31		
Sandstone	29		345'

116' casing
8" hole

Memo FROM McKAY & GOULD DRILLING, INC.

April 28, 1978

Don Heuer Ohio E.P.A.

Enclosed is the log on the test hole that we drilled at Tecumseh Village Feb. 5, 1973. I do not have anything on the pumping test. As I recall, a gentleman by the name of Kerm Riffle of Salem, Ohio, should have the information on the test pumping.

Sorry I can't be of more help on this.

Respectfully,

Jack Gould
President

JG:cc

hole boring performed at Tecumseh Village adjacent to the ASF disposal site on February 5, 1973 is shown as Table 2. This log clearly shows the rock strata present adjacent to the ASF site to be comprised primarily of alternating thick and thin layers of sandstone and shale with varying thickness of coal and underclay. The stratigraphic section and test boring near the facility appear to agree with the general sequence of rock strata present between the Brookville Coal and Middle Kittanning Coal bed within Stark County (Figure 3). Deeper rock strata/aquifers which may be present beneath the site could include the Homewood, Connoquenessing and Sharon Sandstone members of the Pennsylvanian Pottsville formation (Figure 4).

SITE HYDROGEOLOGY

No hydrogeologic cross-sections were submitted by the consultant and the hydrogeology of the site and the aquifer system existing at the facility has not been defined. No water table/potentiometric surface maps were prepared. Potential aquifers at the site of the facility include the alternating sandstone, shale, and coal strata exposed along the strip pit walls along with those strata hydraulically interconnected with those exposed at the base of the excavation. Springs have been noted within the pit area upon * previous inspections of the facility by OEPA personnel. This indicates that the pit/fill area is actually within an aquifer. Static water levels within the initial soil borings all lie at the same approximate elevation as the surface waters of the American Steel Foundry's, Tecumseh and Sebring * Landfill ponds, thus indicating an interconnection between these "ponds" and the local ground-waters.

The base of the excavation appears to lie within a shale rock formation lying beneath the Lower Kittanning Clay. This rock formation may represent the Clarion Shale which has been identified as an aquifer in this area (Stout, 1943, p.440). In the strip pit area waste material has been directly placed atop this unit. The potential for contaminants to enter this rock formation has not been determined.

SOURCES OF LOCAL WATER SUPPLY

Local water well logs in the vicinity of the ASF site in Smith Township are given in Appendix B. The exact locations of these wells with respect to the ASF disposal facility has not been clearly indicated in any technical report submitted by the facility. From these logs, it is apparent that wells drilled in this vicinity draw water from the alternating sandstone, shale, limestone and coal strata present in the bedrock. Depths of the wells range from 161 to 398 feet. Well yields are generally low with large drawdowns. Yields range from 2 to 16 gallons per minute with drawdowns ranging from 80 to 252 feet for pumping durations ranging from one to 24 hours. Static water levels in these wells ranges from depths of 22 feet to 70 feet below ground surface. This data, however, can not be converted into potentiometric surface elevations since no surface elevations were given, well depths are variable and measurements were taken in different years.

IV. Ground Water Monitoring System

Drilling Methods

Between July 9-11, 1985, five (5) borings were installed at the site. Locations of these borings are shown as Figure 6. The borings were completed with a truck-mounted boring rig utilizing hollow-stem augers. Soil samples were taken by means of a 2-inch O.D. split-spoon sampler utilizing standard penetration resistance methods (140 pound hammer, 30-inch drop). Samples were collected at maximum intervals of 5 feet or at major changes in lithology, which ever occurred first. Disturbed auger samples were also collected. These samples were visually classified, logged, and sealed in moisture-proof jars, and brought to the laboratory for study. The position at which an auger sample was obtained is indicated on the boring logs as an "A-type" sample. In addition, four disturbed samples were taken by hydraulically pressing, at a constant rate, 3-inch O.D. thin-walled samplers through the soil strata. The thin-walled samplers were sealed and brought to the laboratory for tests and evaluation. The position at which a thin-walled sample was taken is shown on the boring logs as a "C-type" sample.

Forty-six feet of "NX" size rock core was taken at boring location 11. According to the consultant, Bowser-Morner, this core was taken to confirm the presence of solid rock at the site and to allow determination of the physical characteristics of the rock. The core was made with "NX"-size, diamond coring equipment with a specially designed core barrel for maximum recovery. The position at which this core was taken is indicated on the boring log as a "B-type" sample.

Decontamination procedures for the drilling equipment and soil sampling equipment were not given and it is not known by this author as to whether any type of fluids were introduced into the borehole during drilling/coring which may have influenced results of the ground-water sampling. It is thus not known whether contaminants may have been introduced into the borehole during drilling or to what extent cross-contamination between borings may have occurred. These details should be addressed in the facility's sampling and analysis plan.

Monitor Well Placement/Locations

Figure 7 shows the locations of five borings performed at the site between July 9 and 11, 1985 by Bowser-Morner Consultants. Borings #1 through #4 were completed as monitor wells. Logs of each boring are shown as Appendix C and diagrams of monitor well construction as Appendix D. Table 3 lists the depths and screen intervals of each of these wells.

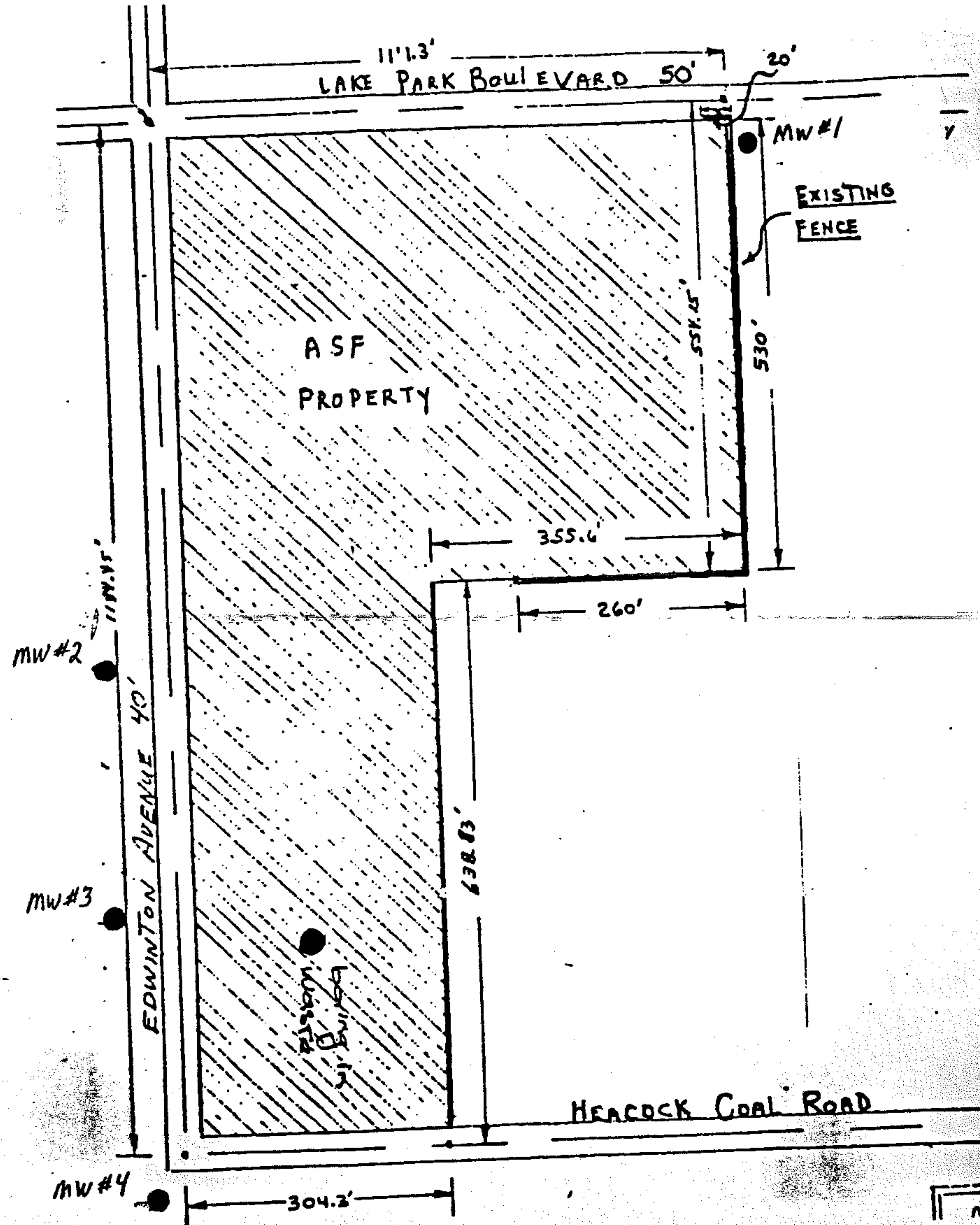
Table 3.
Monitor Wells
American Steel Foundry's Site

Well #	Surface elevation	Top of casing	Screen Interval	Rock type
1	1117.70	1120.30	1073.20 - 1068.20	Shale
2	1094.86	1095.41	1065.76 - 1060.76	Spoil
3	1084.65	1086.85	1064.85 - 1059.85	Spoil
4	1076.42	1079.17	1051.42 - 1046.42	Spoil

The reasoning behind the location and screening intervals of the monitor wells was not clearly stated in the Environmental Assessment Report. The aquifer system present at the facility has not been clearly defined and it is unclear as to what aquifer system these wells are intended to monitor. A preliminary report entitled, "Design of Foundary Waste Disposal, Lake Park Road Project, Alliance, Ohio" indicates that the locations of upgradient versus downgradient well locations was based upon the site topography and regional surface drainage patterns. These locations, however, were not verified by static water level measurements or water table/potentiometric surface maps and no mention was made of the aquifer system these wells were designed to monitor. Vertical screen intervals were simply set to be in the first water level below the waste. This rationale for location of screening intervals is vague and does not appear to be an appropriate method to define and monitor the uppermost aquifer system beneath the facility.

Monitor well #1 was placed at the northeast corner of the site. This well is the only well which is screened within bedrock. The screened interval of monitor well #1 was set within the interval ranging from 1073.20 -1068.20 feet elevation within bedrock in a zone of siltstones interspersed with shale. This interval lies approximately thirty (30) feet above the level of the pit floor/bottom and from three (3) to seventeen (17) feet above the screened intervals of the stated downgradient wells. According to Bowser-Morner consultants, this well is upgradient from the ASF facility.

Figure 7
Location of Monitor Wells,
ASF Sebring Disposal Facility.



However, no water table/piezometric surface maps were presented in support of this conclusion and the location of this monitor well will need to be reviewed. The vertical screen interval of this well was set at an elevation different than that of the stated downgradient monitoring wells within a different rock strata and may not monitor similar ground-water quality conditions. In addition, this well may be located too close to the disposal area to obtain water samples unaffected by materials deposited at the facility. At present it does not appear this well can be considered a proper upgradient well.

Monitor wells #2, 3 and 4 are screened in spoil located either as backfill within the strip pit or as spoil banks along the perimeter of the excavation. Bedrock is not encountered in any of these three wells. The locations and screen intervals of these wells needs to be reviewed since the spoil materials do not represent aquifers in this region. Although there exists the possibility that ground waters within the spoil materials may be hydraulically interconnected with local aquifers, this interconnection has not been demonstrated. Likewise, these wells were stated by the consultant to lie hydraulically downgradient from the landfill facility however no static water level measurements or water table/piezometric surface maps were presented to support this conclusion. Supporting data will need to be submitted in order to show whether these wells are indeed placed in aquifers downgradient from the facility. At present, it can not be determined whether these wells are hydraulically downgradient from the facility.

Due to the locations and depths of the ground-water monitoring wells at the facility, it is not possible to determine the facility's impact on the quality of ground-water. The hydrogeology and aquifer system present at the site has not been adequately defined and the present ground-water monitoring system in place at the facility does not adequately monitor the uppermost aquifer. The reasoning behind the well location and vertical screen intervals was not adequately supported. The reasoning behind the location of upgradient and downgradient monitor wells was likewise poorly supported. Data such as static water levels within the monitor wells and water table/potentiometric surface maps will be needed in order to properly support the upgradient/downgradient locations of these wells. Geologic cross-sections should be modified to show the local aquifer system present at the facility and locations of screen intervals with respect to this system.

Monitor Well Construction

Details of the monitor well construction were given diagrammatically in the consultant's report with no narrative description. Information concerning the construction of the monitor wells was obtained from diagrams of the monitor wells included within the consultant's report entitled " Environmental Assessment of the American Steel Foundry's Lake Park Drive Disposal Site, Alliance, Ohio ". These diagrams are shown as Appendix C. The monitor wells were constructed of 2-inch schedule 40 PVC casing with five foot 0.010 slot screens. In addition, a 6-inch by 5 feet black iron guard iron pipe with a locking cap and lock has been installed for each well. Apparently, the screens were packed in sand and the annular spacing between the casing and borehole sealed with bentonite to the ground surface where a protective cement apron was then emplaced. The dimensions of the sand pack was not stated and is unknown by this author.

Monitor wells were inspected during a site visit on April 20, 1988. Locations and construction details of the monitor wells appear to correspond with those stated by the consultant. Wells are constructed of 2-inch diameter PVC casing with screw-on top covers and protective black iron casing with locking cap and lock. A concrete apron surrounds each well. All the wells appear to have good structural integrity and appear to be of sound construction.

Methods of sealing the annular space of the well and information concerning the geometry of the sand pack has not been provided by the consultant. Methods of emplacement of the sand pack, the type of sand used in the pack and procedures employed for decontamination of both the monitor well casing and sand pack were not stated. It is presently unclear to this author whether contaminants may have been introduced into the well by these materials. These details should be clearly explained in the facility sampling and analysis plan. Because of this lack of information, it is not possible to determine whether these monitor wells meet the construction requirements outline in 265.91(c)/OAC 3745-65-91(c).

V. Sampling and Analysis

The facility does not have a formal sampling and analysis plan. Without this plan, analytical results for ground-water sampling at the facility can not be properly interpreted. Procedures for decontamination of equipment, well evacuation, sample collection, preservation and shipment should be clearly detailed in the plan. Included with the plan should be a detailed description of the analytical procedures employed along with the detection limits, chain of custody controls and laboratory QA/QC procedures.

Ground-Water Sampling Data

According to records available at the Northeast District Office of the Ohio EPA, monitor wells were sampled on three separate occasions in 1985 and once again in 1986 and 1987. In 1985, monitor wells were sampled on September 19, August 15, and July 22-23. During the August 15th round of sampling, the OEPA took split samples from monitor well #1 and took their own samples from monitor wells #2, 3, and #4. Wells were again sampled on August 29, 1986 and September 2, 1987. Water quality results for each round of sampling are shown in Appendix E.

Drinking Water Parameters.

Table 2 lists the twenty-one (21) parameters required under this section in order to characterize the suitability of the ground-water as a drinking water supply.

Table 2. Drinking Water Standards.

Parameter	Maximum level (mg/l)	Parameter	Maximum level (mg/l)
Arsenic	0.05	Endrin	0.0002
Barium	1.0	Lindane	0.004
Cadmium	0.01	Methoxychlor	0.1
Chromium	0.05	Toxaphene	0.005
Fluoride	1.4–2.4	2,4-D	0.1
Lead	0.05	2,4,5-TP Silvex	0.01
Mercury	0.002	Radium	5 pCi/1
Nitrate (as N)	10	Gross Alpha	15 pCi/1
Selenium	0.01	Gross Beta	4 millirem/yr
Silver	0.05	Turbidity	1/TU
		Coliform Bacteria	1/100 ml

Only five of the required twenty-one parameters were analyzed during the three rounds of ground-water sampling in 1985. Results of these analyses are listed below. Parameters found to exceed the USEPA Maximum Contaminant Levels are underscored.

Drinking Water Parameters
July 23, 1985 Sampling

Parameter (mg/l)	Well #1	Well #2	Well #3	Well #4	MCL
Cadmium	<0.01	**0.02**	**0.01**	<0.01	0.01
Chromium	<0.01	0.01	0.01	<0.01	0.05
Fluoride	0.21	0.66	0.29	0.24	1.4-2.4
Lead	0.02	**0.07**	**0.06**	0.03	0.05
Nitrate	2.5	<1.0	<1.0	<1.0	10.0

Drinking Water Parameters
August 15, 1985 Sampling

Parameter (mg/l)	Well #1	Well #2	Well #3	Well #4	MCL
Chromium	<0.01	**0.05**	0.04	**0.06**	0.05
Fluoride	.25	1.1	0.40	0.33	1.4-2.4
Lead	**0.10**	**0.13**	**0.06**	**0.06**	0.05
Nitrate	1.3	<1.0	<1.0	<1.0	10.0

Drinking Water Parameters
September 18, 1985 Sampling

Parameter (mg/l)	Well #1	Well #2	Well #3	Well #4	MCL
Cadmium	<0.01	**0.01**	<0.01	<0.01	0.01
Chromium	<0.01	<0.01	<0.01	<0.01	0.05
Fluoride	1.0	<1.0	1.0	<1.0	1.4-2.4
Lead	0.03	**0.07**	0.04	0.03	0.05
Nitrate	<1.0	<1.0	1.0	<1.0	10.0

The August 29, 1986 round of sampling included only four of the required twenty-one (21) parameters. Results of these analysis' are shown below.

Drinking Water Parameters
August 29, 1986 Sampling

Parameter (mg/l)	Well #1	Well #2	Well #3	Well #4	MCL
Cadmium	<0.01	<0.01	<0.01	<0.01	0.01
Chromium	<0.01	0.02	0.01	0.02	0.05
Lead	<0.02	<0.02	<0.02	<0.02	0.05
Nitrate	<0.1	1.8	**11.0**	1.3	10.0

In the September 2,1987 round of sampling, the analysis' were expanded to include ten (10) of the required twenty-one (21) parameters used to characterize the suitability of the ground-water as a drinking water supply. These results are listed below.

American Steel Foundry,
Mahoning County, Ohio.

Drinking Water Parameters
September 2, 1987 Round of Sampling

<u>Parameter</u> (mg/l)	Well <u>#1</u>	Well <u>#2</u>	Well <u>#3</u>	Well <u>#4</u>	<u>MCL</u>	
Arsenic	<0.004	<0.002	<0.002	<0.002	0.05	
Barium	* <5.0	* <5.0	* <5.0	* <5.0	1.0	
Cadmium	**<u>0.01</u>**	**<u>0.01</u>**	**<u>0.01</u>**	**<u>0.01</u>**	0.01	✓
Chromium	0.02	0.02	0.02	<0.01	0.05	
Fluoride	N/A	N/A	N/A	N/A	1.4-2.4	
Lead	<0.02	<0.02	<0.02	<0.02	0.05	✓
Mercury	<0.001	<0.001	<0.001	<0.001	0.002	
Nitrate	0.71	0.29	0.69	0.16	10.0	
Selenium	<0.004	<0.002	<0.002	<0.002	0.01	
Silver	<0.01	<0.01	<0.01	<0.01	0.05	

* - Asterisks indicate detection limits above MCL.

<u>Ground-Water Quality Parameters</u>

Parameters used in establishing ground-water quality are chloride, iron, manganese, sodium and sulfate. Parameters tested are listed in Table along with the concentrations found. The facility has not tested for all required parameters during the first five rounds of sampling in 1985 and 1987. Results of these analysis' are listed below.

Ground-Water Quality Parameters
July 23, 1985 Round of Sampling

<u>Parameter</u> (mg/l)	Well <u>#1</u>	Well <u>#2</u>	Well <u>#3</u>	Well <u>#4</u>
Chloride	32.0	32.0	160.0	38.0
Iron	16.0	180.0	18.0	12.0
Manganese	------------NOT ANALYZED------------			
Phenols (ug/l)	43.0	24.0	13.0	9.0
Sodium	53.0	28.0	110.0	32.0
Sulfate	410.0	1850.0	1280.0	460.0

American Steel Foundry,
Mahoning County, Ohio.

Ground-Water Quality Parameters
August 15, 1985 Sampling

Parameter (mg/l)	Well #1	Well #2	Well #3	Well #4
Chloride	21.0	13.0	120.0	35.0
Iron	43.0	260.0	16.0	16.0
Manganese	------NOT ANALYZED------			
Phenols	0.030	0.075	0.038	0.020
Sodium	53.0	25.0	116.0	35.0
Sulfate	430.0	2100.0	1250.0	560.0

Ground-Water Quality Parameters
September 18, 1985 Sampling

Parameter (mg/l)	Well #1	Well #2	Well #3	Well #4
Chloride	81.0	51.0	213.0	66.0
Iron	[illegible]	130.0	11.0	14.0
Manganese	------NOT ANALYZED------			
Phenols	0.005	<0.004	0.022	0.019
Sodium	36.0	19.0	130.0	30.0
Sulfate	749.0	2320.0	921.0	495.0

Ground-Water Quality Parameters
August 29, 1986 Sampling

Parameter (mg/l)	Well #1	Well #2	Well #3	Well #4
Chloride	97.0	35.0	140.0	25.0
Iron	175.0	245.0	9.0	6.5
Manganese	------NOT ANALYZED------			
Phenols	0.020	<0.005	<0.005	0.030
Sodium	52.0	18.0	110.0	28.0
Sulfate	1300.0	2700.0	1200.0	640.0

In 1987, only four (4) of six (6) required parameters were sampled as listed below.

Ground-Water Quality Parameters
September 2, 1987 Sampling

Parameter (mg/l)	Well #1	Well #2	Well #3	Well #4
Chloride	84.0	33.0	129.0	36.0
Iron	176.0	273.0	18.0	13.0
Manganese	------------NOT ANALYZED----------------			
Phenols	----------NOT ANALYZED----------------			
Sodium	75.0	37.0	410.0	45.0
Sulfate	740.0	2500.0	950.0	430.0

Ground-Water Contamination Indicators

Parameters used as indicators of ground-water contamination are: pH, Specific Conductance, Total Organic Carbon, and Total Organic Halogen. A list of these parameters analyzed by the facility are listed in the following tables. As noted in the table, no measurements for total organic halogens were made for the ground-water samples taken at the facility.

Ground-Water Contamination Indicators
July 23, 1985 Sampling

Parameters	Well #1	Well #2	Well #3	Well #4
pH	5.7	4.9	6.3	6.4
Conductivity	8720	26,000	26,700	12,600 umhos/cm
TOC (mg/l)	------------NOT ANALYZED---------------			
TOX	------------NOT ANALYZED---------------			

American Steel Foundry,
Mahoning County, Ohio.

Ground-Water Contamination Indicators
August 13, 1985

Parameters	Well #1	Well #2	Well #3	Well #4	
pH	3.6	4.6	6.2	6.4	
Conductivity	800	2,300	2,280	1,170	umhos/cm
TOC (mg/l)	42.8	721.0	43.2	13.2	
TOX	-----------NOT ANALYZED-----------------------				

Ground-Water Contamination Indicators
September 18, 1985

Parameters	Well #1	Well #2	Well #3	Well #4	
pH	6.1	5.1	6.9	6.9	
Conductivity	1,400	3,180	2,690	1,050	umhos/cm
TOC (mg/l)	48.4	45.1	94.6	36.2	
TOX	-----------NOT ANALYZED-----------------------				

Ground-Water Contamination Indicators
August 29, 1986 Sampling

Parameters	Well #1	Well #2	Well #3	Well #4	
pH	3.6	3.2	7.2	7.0	
Conductivity	2,080	3,370	2,600	2,630	umhos/cm
TOC (mg/l)	6.7	11.3	7.8	6.2	
TOX	--------- NOT ANALYZED-----------------------				

American Steel Foundry,
Mahoning County, Ohio.

Ground-Water Contamination Indicators
September 2, 1987 Sampling

Parameters	Well #1	Well #2	Well #3	Well #4	
pH	3.9	4.6	6.3	6.4	
Conductance	1,710	3,840	2,730	1,310	umhos/cm
TOC (mg/l)	4.0	16.3	3.8	<3.0	
TOX	-----------NOT ANALYZED-----------------------				

American Steel Foundry,
Mahoning County, Ohio.

COMPLIANCE STATUS SUMMARY

As a result of this Comprehensive Ground Water Monitoring Evaluation, several violations of state and federal regulations have been indentified. Each violation is cited below, and a brief corresponding explanation of the nature of the violation is provided as well. For additional information, the attached RCRA checklists should be consulted. All citations are based on both federal and state statues.

40 CFR 265.90(a) / OAC 3745-65-90(A).

The facility has not implemented a ground-water monitoring program capable of determining the facility's impact upon the quality of ground-water in the uppermost aquifer underlying the facility. The aquifer system at the facility has not been identified and the depths and locations of the monitor wells does not allow monitoring of all aquifers susceptible to contamination from wastes deposited at the facility.

40 CFR 265.92(a) / OAC 3745-65-92(A).

The facility does not have a sampling and analysis plan. This plan must be kept at the facility and include procedures and techniques for sample collection, sample preservation and shipment, analytical procedures and chain of custody control.

40 CFR 265.92(c)(1) / OAC 3745-65-92(C)(1).

Background concentrations for those parameters characterizing the suitability of the ground-water as a drinking water supply have not been determined. Background concentrations of parameters used in establishing ground-water quality have not been determined. Background concentrations of parameters used as indicators of ground-water contamination have not been determined.

40 CFR 265.93(a) / OAC 3745-65-93(A).

The owner/operator has not prepared an outline of a ground-water quality assessment program. The outline must describe a more comprehensive ground-water monitoring program that is capable of determining:

1) Whether hazardous wastes have entered the ground-water;

2) The rate and extent of migration of hazardous was[te] or hazardous waste constituents in the ground-wat[er]

3) The concentrations of hazardous waste or hazardou[s] waste constituents in the ground-water.

APPENDIX A

RCRA CHECKLISTS

American Steel Foundry,

Smith Township, Mahoning County

APPENDIX A

COMPREHENSIVE GROUND-WATER MONITORING EVALUATION WORKSHEET

The following worksheets have been designed to assist the enforcement officer/technical reviewer in evaluating the ground-water monitoring system an owner/operator uses to collect and analyze samples of ground water. The focus of the worksheets is technical adequacy as it relates to obtaining and analyzing representative samples of ground water. The basis of the worksheets is the final RCRA Ground Water Monitoring Technical Enforcement Guidance Document which describes in detail the aspects of ground-water monitoring which EPA deems essential to meet the goals of RCRA.

Appendix A is not a regulatory checklist. Specific technical deficiencies in the monitoring system can, however, be related to the regulations as illustrated in Figure 4.3 taken from the RCRA Ground-Water Monitoring Compliance Order Guide (COG) (included at the end of the appendix). The enforcement officer, in developing an enforcement order, should relate the technical assessment from the worksheets to the regulations using figure 4.3 from the COG as a guide.

I. Office Evaluation - Technical Evaluation of the Design of the Ground-water Monitoring System

A. Review of relevant documents:

1. What documents were obtained prior to conducting the inspection:

a. RCRA Part A permit application? (Y/N) N } NOT PERMITTED
b. RCRA Part B permit application? (Y/N) N
c. Correspondence between the owner/operator and appropriate agencies or citizen's groups? (Y/N) Y
d. Previously conducted facility inspection reports? (Y/N) Y
e. Facility's contractor reports? (Y/N) Y
f. Regional hydrogeologic, geologic, or soil reports? (Y/N) Y
g. The facility's Sampling and Analysis Plan? (Y/N) N - NO PLAN
h. Ground-water Assessment Program Outline (or Plan, if the facility is in assessment monitoring)? (Y/N) N - NO OUTLINE
i. Other (specify) ____________

B. Evaluation of the Owner/Operator's Hydrogeologic Assessment:

1. Did the owner/operator use the following direct techniques in the hydrogeologic assessment:

a. Logs of the soil borings/rock corings (documented by a professional geologist, soil scientist, or geotechnical engineer)? (Y/N) Y
b. Materials tests (e.g., grain size analyses, standard penetration tests, etc.)? (Y/N) Y RAW DATA NOT PROVIDED
c. Piezometer installation for water level measurements at different depths? (Y/N) N
d. Slug tests? (Y/N) N

e. Pump tests? (Y/N) N
f. Geochemical analyses of soil samples? (Y/N) N
g. Other (specify) (e.g., hydrochemical diagrams and wash analysis) hydrochemical diagrams (bar charts)

2. Did the owner/operator use the following indirect techniques to supplement direct techniques data:

a. Geophysical well logs? (Y/N) N
b. Tracer studies? (Y/N) N
c. Resistivity and/or electromagnetic conductance? (Y/N) N
d. Seismic Survey? (Y/N) N
e. Hydraulic conductivity measurements of cores? (Y/N) Y
f. Aerial photography? (Y/N) N
g. Ground penetrating radar? (Y/N) N
h. Other (specify) ______

3. Did the owner/operator document and present the raw data from the site hydrogeologic assessment? (Y/N) Y

4. Did the owner/operator document methods (criteria) used to correlate and analyze the information? (Y/N) N

5. Did the owner/operator prepare the following:

a. Narrative description of geology? (Y/N) Y INCOMPLETE HOWEVER
b. Geologic cross sections? (Y/N) Y
c. Geologic and soil maps? (Y/N) N
d. Boring/coring logs? (Y/N) Y
e. Structure contour maps of the differing water bearing zones and confining layer? (Y/N) N
f. Narrative description and calculation of ground-water flows? (Y/N) N
g. Water table/potentiometric map? (Y/N) N
h. Hydrologic cross sections? (Y/N) N

6. Did the owner/operator obtain a regional map of the area and delineate the facility? (Y/N) Y

If yes, does this map illustrate:

a. Surficial geology features? (Y/N) N
b. Streams, rivers, lakes, or wetlands near the facility? (Y/N) Y
c. Discharging or recharging wells near the facility? (Y/N) N

7. Did the owner/operator obtain a regional hydrogeologic map? (Y/N) N

If yes, does this hydrogeologic map indicate:

a. Major areas of recharge/discharge? (Y/N) —
b. Regional ground-water flow direction? (Y/N) —
c. Potentiometric contours which are consistent with observed water level elevations? (Y/N) —

8. Did the owner/operator prepare a facility site map? (Y/N) N

If yes, does the site map show:

a. Regulated units of the facility (e.g., landfill areas, impoundments)? (Y/N) —
b. Any seeps, springs, streams, ponds, or wetlands? (Y/N) —
c. Location of monitoring wells, soil borings, or test pits? (Y/N) —
d. How many regulated units does the facility have? ______
   If more than one regulated unit then,
   o Does the waste management area encompass all regulated units? (Y/N) —
   Or
   o Is a waste management area delineated for each regulated unit? (Y/N) —

C. Characterization of Subsurface Geology of Site

1. Soil boring/test pit program:

a. Were the soil borings/test pits performed under the supervision of a qualified professional? (Y/N) Y
b. Did the owner/operator provide documentation for selecting the spacing for borings? (Y/N) N
c. Were the borings drilled to the depth of the first confining unit below the uppermost zone of saturation or ten feet into bedrock? (Y/N) U Geology/Aquifer System Poorly defined
d. Indicate the method(s) of drilling:
   o Auger (hollow or solid stem) ✓
   o Mud rotary ____
   o Reverse rotary ____
   o Cable tool ____
   o Jetting ____
   o Other (specify) ____
e. Were continuous sample corings taken? (Y/N) N
   5 ft intervals or change in lithology whichever occurs first

f. How were the samples obtained (checked method[s])
- o Split spoon ✓
- o Shelby tube, or similar ___
- o Rock coring ✓
- o Ditch sampling ___
- o Other (explain) ✓

Auger samples

g. Were the continuous sample corings logged by a qualified professional in geology? (Y/N) U

h. Does the field boring log include the following information:
- o Hole name/number? (Y/N) Y
- o Date started and finished? (Y/N) Y
- o Driller's name? (Y/N) N
- o Hole location (i.e., map and elevation)? (Y/N) N
- o Drill rig type and bit/auger size? (Y/N) Y
- o Gross petrography (e.g., rock type) of each geologic unit? (Y/N) Y
- o Gross mineralogy of each geologic unit? (Y/N) N
- o Gross structural interpretation of each geologic unit and structural features (e.g., fractures, gouge material, solution channels, buried streams or valleys, identification of depositional material)? (Y/N) Y
- o Development of soil zones and vertical extent and description of soil type? (Y/N) N
- o Depth of water bearing unit(s) and vertical extent of each? (Y/N) N
- o Depth and reason for termination of borehole? (Y/N) N
- o Depth and location of any contaminant encountered in borehole? (Y/N) N
- o Sample location/number? (Y/N) Y
- o Percent sample recovery? (Y/N) N
- o Narrative descriptions of:
  - -- Geologic observations? (Y/N) Y
  - -- Drilling observations? (Y/N) N

i. Were the following analytical tests performed on the core samples:
- o Mineralogy (e.g., microscopic tests and x-ray diffraction)? (Y/N) N
- o Petrographic analysis:
  - - degree of crystallinity and cementation of matrix? (Y/N) N
  - - degree of sorting, size fraction (i.e., sieving), textural variations? (Y/N) N

- rock type(s)? (Y/N) N
- soil type? (Y/N) –
- approximate bulk geochemistry? (Y/N) N
- existence of microstructures that may effect or indicate fluid flow? (Y/N) N

o Falling head tests? (Y/N) N
o Static head tests? (Y/N) Y
o Settling measurements? (Y/N) N
o Centrifuge tests? (Y/N) N
o Column drawings? (Y/N) N

D. Verification of subsurface geological data

1. Has the owner/operator used indirect geophysical methods to supplement geological conditions between borehole locations? (Y/N) N
2. Do the number of borings and analytical data indicate that the confining layer displays a low enough permeability to impede the migration of contaminants to any stratigraphically lower water-bearing units? (Y/N) N
3. Is the confining layer laterally continuous across the entire site? (Y/N) N
4. Did the owner/operator consider the chemical compatibility of the site-specific waste types and the geologic materials of the confining layer? (Y/N) N
5. Did the geologic assessment address or provide means for resolution of any information gaps of geologic data? (Y/N) N
6. Do the laboratory data corroborate the field data for petrography? (Y/N) N Lab data not provided
7. Do the laboratory data corroborate the field data for mineralogy and subsurface geochemistry? (Y/N) – NOT PERFORMED

E. Presentation of geologic data

1. Did the owner/operator present geologic cross sections of the site? (Y/N) Y
2. Do cross sections:
   a. identify the types and characteristics of the geologic materials present? (Y/N) N
   b. define the contact zones between different geologic materials?
   c. note the zones of high permeability or fracture? (Y/N) N
   d. give detailed borehole information including:
      o location of borehole? (Y/N) Y
      o depth of termination? (Y/N) Y
      o location of screen (if applicable)? (Y/N) N
      o depth of zone(s) of saturation? (Y/N) N
      o backfill procedure?

3. Did the owner/operator provide a topographic map which was constructed by a licensed surveyor? (Y/N) N
4. Does the topographic map provide:
   a. contours at a maximum interval of two-feet? (Y/N) — NOT SUBMITTE
   b. locations and illustrations of man-made features (e.g., parking lots, factory buildings, drainage ditches, storm drains, pipelines, etc.)? (Y/N) —
   c. descriptions of nearby water bodies? (Y/N) —
   d. descriptions of off-site wells? (Y/N) —
   e. site boundaries? (Y/N) —
   f. individual RCRA units? (Y/N) —
   g. delineation of the waste management area(s)? (Y/N) —
   h. well and boring locations? (Y/N) —
5. Did the owner/operator provide an aerial photograph depicting the site and adjacent off-site features? (Y/N) N
6. Does the photograph clearly show surface water bodies, adjacent municipalities, and residences and are these clearly labelled? (Y/N) — NO PHOTO

F. Identification of Ground-Water Flowpaths

1. Ground-water flow direction

   a. Was the well casing height measured by a licensed surveyor to the nearest 0.01 feet? (Y/N) U
   b. Were the well water level measurements taken within a 24 hour period? (Y/N) U
   c. Were the well water level measurements taken to the nearest 0.01 feet? (Y/N) N
   d. Were the well water levels allowed to stabilize after construction and development for a minimum of 24 hours prior to measurements? (Y/N) U
   e. Was the water level information obtained from (check appropriate one):
      o multiple piezometers placed in single borehole? ____
      o vertically nested piezometers in closely spaced separate boreholes? ____
      o monitoring wells ✓

f. Did the owner/operator provide construction details for the piezometers? (Y/N) — NO PIEZOMETERS — ONLY MONITOR WELLS

g. How were the static water levels measured (check method(s).
- o Electric water sounder ____
- o Wetted tape ____
- o Air line ____
- o Other (explain) ✓
  unknown

h. Was the well water level measured in wells with equivalent screened intervals at an equivalent depth below the saturated zone? (Y/N) U Aquifer system not well defined

i. Has the owner/operator provided a site water table (potentiometric) contour map? If yes, N
- o Do the potentiometric contours appear logical and accurate based on topography and presented data? (Consult water level data) (Y/N) –
- o Are ground-water flow-lines indicated? (Y/N) –
- o Are static water levels shown? (Y/N) –
- o Can hydraulic gradients be estimated? (Y/N) –

j. Did the owner/operator develop hydrologic cross sections of the vertical flow component across the site using measurements from all wells? (Y/N) N

k. Do the owner/operator's flow nets include:
- o piezometer locations? (Y/N) NA - no flow nets provided
- o depth of screening? (Y/N) –
- o width of screening? (Y/N) –
- o measurements of water levels from all wells and piezometers? (Y/N) –

2. Seasonal and temporal fluctuations in ground-water level

a. Do fluctuations in static water levels occur? (Y/N) U
- o If yes, are the fluctuations caused by any of the following:
- — Off-site well pumping (Y/N) –
- — Tidal processes or other intermittent natural variations (e.g., river stage, etc.) (Y/N) –
- — On-site well pumping (Y/N) –
- — Off-site, on-site construction or changing land use patterns (Y/N) –
- — Deep well injection (Y/N) –
- — Seasonal variations (Y/N) –
- — Other (specify) ____________

b. Has the owner/operator documented sources and patterns that contribute to or affect the ground-water patterns below the waste management? (Y/N) N

c. Do water level fluctuations alter the general ground-water gradients and flow directions? (Y/N) U - NOT MEASURED

d. Based on water level data, do any head differentials occur that may indicate a vertical flow component in the saturated zone? (Y/N) U NO WATER LEVEL DATA PROVIDED

e. Did the owner/operator implement means for gauging long term effects on water movement that may result from on-site or off-site construction or changes in land-use patterns? (Y/N) N

3. Hydraulic conductivity

a. How were hydraulic conductivities of the subsurface materials determined?
   - o Single-well tests (slug tests)? (Y/N) –
   - o Multiple-well tests (pump tests) (Y/N) –
   - o Other (specify) Constant head permeameter

b. If single-well tests were conducted, was it done by:
   - o Adding or removing a known volume of water, (Y/N) – NO SINGLE WELL TESTS PERFORMED

   or
   - o Pressurizing well casing (Y/N) –

c. If single well tests were conducted in a highly permeable formation, were pressure transducers and high-speed recording equipment used to record the rapidly changing water levels? (Y/N) – N/A

d. Since single well tests only measure hydraulic conductivity in a limited area, were enough tests run to ensure a representative measure of conductivity in each hydrogeologic unit? (Y/N) – N/A

e. Is the owner/operator's slug test data (if applicable) consistent with existing geologic information (e.g., boring logs)? (Y/N) – N/A

f. Were other hydraulic conductivity properties determined? (Y/N) Y

g. If yes, provide any of the following data, if available:
   - o Transmissivity ____
   - o Storage coefficient ____
   - o Leakage ✓
   - o Permeability ____
   - o Porosity ____
   - o Specific capacity ____
   - o Other (specify) ____

4. Identification of the uppermost aquifer

a. Has the extent of the uppermost saturated zone (aquifer) in the facility area been defined? If yes, (Y/N) N
   o Are soil boring/test pit logs included? (Y/N) Y
   o Are geologic cross-sections included? (Y/N) Y - INCOMPLETE

b. Is there evidence of confining (competent, unfractured, continuous, and low permeability) layers beneath the site? (Y/N) N
   o If yes, how was continuity demonstrated?

____

____

c. What is hydraulic conductivity of the confining unit (if present)? U CM/Sec
   How was it determined? NOT DETERMINED.

d. Does potential for other hydraulic communication exist (e.g., lateral incontinuity between geologic units, facies changes, fracture zones, cross cutting structures, or chemical corrosion/alteration of geologic units by leachage? (Y/N) Y
   If yes or no what is the rationale? (1) Geologic strata exposed along highwall of excavation.

____

____

G. Office Evaluation of the Facility's Ground-Water Monitoring System

Monitoring Well Design and Construction:
These questions should be answered for each different well design present at the facility.

1. Drilling Methods

a. What drilling method was used for the well? ✓
   o Hollow-stem auger ____
   o Solid-stem auger ____
   o Mud rotary ____
   o Air rotary ____
   o Reverse rotary ____
   o Cable tool ____
   o Jetting ____
   o Air drill with casing hammer ____
   o Other (specify) Rock coring

b. Were any cutting fluids (including water) or additives used during drilling? (Y/N) U - details not provided
   If yes, specify
   Type of drilling fluid ______________________________
   Source of water used ______________________________
   Foam ______________________________
   Polymers ______________________________
   Other ______________________________

c. Was the cutting fluid, or additive, identified? (Y/N) N

d. Was the drilling equipment steam-cleaned prior to drilling the well? (Y/N) U - details not provided

Other methods ____

e. Was compressed air used during drilling? (Y/N) U details not provided

o If yes, was the air filtered to remove oil? (Y/N) —

f. Did the owner/operator document procedure for establishing the potentiometric surface? (Y/N) N

o If yes, how was the location established?

g. Formation samples

o Were formation samples collected initially during drilling? (Y/N) Y

o Were any cores taken continuous? (Y/N) Y Monitor well #1

If not, at what interval were samples taken? ____

o How were the samples obtained?

- Split spoon ✓
- Shelby tube ✓
- Core drill ✓
- Other (specify) auger samples

o Identify if any physical and/or chemical tests were performed on the formation samples (specify) permeability testing

2. Monitoring Well Construction Materials

a. Identify construction materials (by number) and diameters (ID/OD)

	Material	Diameter (ID/OD)
o Primary Casing	Schedule 40 PVC	2 inch
o Secondary or outside casing (double construction)		
o Screen	?	?

b. How are the sections of casing and screen connected?

o Pipe sections threaded ____

o Couplings (friction) with adhesive or solvent ____

o Couplings (friction) with retainer screws ____

o Other (specify) not detailed / unknown to this author

c. Were the materials steam-cleaned prior to installation? (Y/N) U NOT DETAILED
If no, how were the materials cleaned? unknown/not detailed

3. Well Intake Design and Well Development

a. Was a well intake screen installed? (Y/N) Y
o What is the length of the screen for the well? 5 foot
o Is the screen manufactured? (Y/N) Y

b. Was a filter pack installed? (Y/N) Y
o What kind of filter pack was employed? sand
o Is the filter pack compatible with formation materials? (Y/N) U - NOT DETAILED
o How was the filter pack installed? not detailed
o What are the dimensions of the filter pack? not detailed
o Has a turbidity measurement of the well water ever been made? (Y/N) N
o Have the filter pack and screen been designed for the in situ materials? (Y/N) U

c. Well development
Was the well developed? (Y/N) Y
o What technique was used for well development?
- Surge block ____
- Bailer ____
- Air surging ____
- Water pumping ✓
- Other (specify) ____

4. Annular Space Seals

a. What is the annular space in the saturated zone directly above the filter pack filled with?
✓ - Sodium bentonite (specify type and grit) type and grit not specified
- Cement (specify neat or concrete) ____
- Other (specify) ____
o Was the seal installed by?
- Dropping material down the hole and tamping U
- Dropping material down the inside of hollow-stem auger U
- Tremie pipe method U
- Other (specify) U

b. Was a different seal used in the unsaturated zone? (Y/N) U
If yes,
o Was this seal made with?
- Sodium bentonite (specify type and grit) ____
- Cement (specify neat or concrete) ____
- Other (specify) ____

o Was this seal installed by?
- Dropping material down the hole and tamping U
- Dropping material down the inside of hollow stem auger U
- Other (specify) ______

c. Is the upper portion of the borehole sealed with a concrete cap to prevent infiltration from the surface? (Y/N) Y
d. Is the well fitted with an above-ground protective device and bumper guards? NO BUMPER GUARDS (Y/N) N
e. Has the protective cover been installed with locks to prevent tampering (Y/N) Y

H. Evaluation of the Facility's Detection Monitoring Program

1. Placement of Downgradient Detection Monitoring Wells

a. Are the ground-water monitoring wells or clusters located immediately adjacent to the waste management area? (Y/N) Y
b. How far apart are the detection monitoring wells?
4 wells, #2,3 and 4 are approx. 300 feet apart on a line, mw#1 approx 1,800 ft along fill boundary from mw#4 and approx. 1650 ft along perimeter from mw#2 (see site map)
c. Does the owner/operator provide a rationale for the location of each monitoring well or cluster? (Y/N) Y topography, 1st water encounter
d. Has the owner/operator identified the well screen lengths of each monitoring well or clusters? (Y/N) Y
e. Does the owner/operator provide an explanation for the well screen lengths of each monitoring well or cluster? (Y/N) N
f. Do the actual locations of monitoring wells or clusters correspond to those identified by the owner/operator? (Y/N) Y

2. Placement of Upgradient Monitoring Wells

a. Has the owner/operator documented the location of each upgradient monitoring well or cluster? (Y/N) Y - appears inappropriate
b. Does the owner/operator provide an explanation for the location(s) of the upgradient monitoring wells? (Y/N) Y - not appropriate
c. What length screen has the owner/operator employed in the background monitoring well(s)?
5 feet
d. Does the owner/operator provide an explanation for the screen length(s) chosen? (Y/N) N
e. Does the actual location of each background monitoring well or cluster correspond to that identified by the owner/operator? (Y/N) Y

I. Office Evaluation of the Facility's Assessment Monitoring Program

1. Does the assessment plan specify: NO ASSESSMENT PLAN
   a. The number, location, and depth of wells? (Y/N) –
   b. The rationale for their placement and identify the basis that will be used to select subsequent sampling locations and depths in later assessment phases? (Y/N) N
2. Does the list of monitoring parameters include all hazardous waste constituents from the facility? (Y/N) N - see text
   a. Does the water quality parameter list include other important indicators not classified as hazardous waste constituents? (Y/N) Y - see text
   b. Does the owner/operator provide documentation for the listed wastes which are not included? (Y/N) N
3. Does the owner/operator's assessment plan specify the procedures to be used to determine the rate of constituent migration in the ground-water? (Y/N) N
4. Has the owner/operator specified a schedule of implementation in the assessment plan? (Y/N) N
5. Have the assessment monitoring objectives been clearly defined in the assessment plan? (Y/N) N - NO PLAN
   a. Does the plan include analysis and/or re-evaluation to determine if significant contamination has occurred in any of the detection monitoring wells? (Y/N) –
   b. Does the plan provide for a comprehensive program of investigation to fully characterize the rate and extent of contaminant migration from the facility? (Y/N) –
   c. Does the plan call for determining the concentrations of hazardous wastes and hazardous waste constituents in the ground water? (Y/N) –
   d. Does the plan employ a quarterly monitoring program? (Y/N) –
6. Does the assessment plan identify the investigatory methods that will be used in the assessment phase? (Y/N) N - NO PLAN
   a. Is the role of each method in the evaluation fully described? (Y/N) –
   b. Does the plan provide sufficient descriptions of the direct methods to be used? (Y/N) –
   c. Does the plan provide sufficient descriptions of the indirect methods to be used? (Y/N) –
   d. Will the method contribute to the further characterization of the contaminant movement? (Y/N) –
7. Are the investigatory techniques utilized in the assessment program based on direct methods? (Y/N) – NO PLAN
   a. Does the assessment approach incorporate indirect methods to further support direct methods? (Y/N) ___
   b. Will the planned methods called for in the assessment approach ultimately meet performance standards for assessment monitoring? (Y/N) ___

c. Are the procedures well defined? (Y/N) — NO ASSESS. PLAN
d. Does the approach provide for monitoring wells similar in design and construction as the detection monitoring wells? (Y/N) —
e. Does the approach employ taking samples during drilling or collecting core samples for further analysis? (Y/N) —

8. Are the indirect methods to be used based on reliable and accepted geophysical techniques? (Y/N) —
a. Are they capable of detecting subsurface changes resulting from contaminant migration at the site? (Y/N) —
b. Is the measurement at an appropriate level of sensitivity to detect ground-water quality changes at the site? (Y/N) —
d. Is the method appropriate considering the nature of the subsurface materials? (Y/N) —
e. Does the approach consider the limitations of these methods? (Y/N) —
f. Will the extent of contamination and constituent concentration be based on direct methods and sound engineering judgment? (Using indirect methods to further substantiate the findings) (Y/N) —

9. Does the assessment approach incorporate any mathematical modeling to predict contaminant movement? (Y/N) N - NO ASSESS PLAN
a. Will site specific measurements be utilized to accurately portray the subsurface? (Y/N) —
b. Will the derived data be reliable? (Y/N) —
c. Have the assumptions been identified? (Y/N) —
d. Have the physical and chemical properties of the site-specific wastes and hazardous waste constituents been identified? (Y/N) —

J. Conclusions

1. Subsurface geology

a. Has sufficient data been collected to adequately define petrography and petrographic variation? (Y/N) N
b. Has the subsurface geochemistry been adequately defined? (Y/N) N
c. Was the boring/coring program adequate to define subsurface geologic variation? (Y/N) N - only 2 borings to bedrock
d. Was the owner/operator's narrative description complete and accurate in its interpretation of the data? (Y/N) N - incomplete
e. Does the geologic assessment address or provide means to resolve any information gaps? (Y/N) N

2. Ground-water flowpaths

a. Did the owner/operator adequately establish the horizontal and vertical components of ground-water flow? (Y/N) N
b. Were appropriate methods used to establish ground-water flowpaths? (Y/N) N
c. Did the owner/operator provide accurate documentation? (Y/N) N
d. Are the potentiometric surface measurements valid? (Y/N) N - NOT GIVEN
e. Did the owner/operator adequately consider the seasonal and temporal effects on the ground-water? (Y/N) N
f. Were sufficient hydraulic conductivity tests performed to document lateral and vertical variation in hydraulic conductivity in the entire hydrogeologic subsurface below the site? (Y/N) N

3. Uppermost aquifer

a. Did the owner/operator adequately define the uppermost aquifer? (Y/N) N - see Text of report

4. Monitoring Well Construction and Design

a. Do the design and construction of the owner/operator's ground-water monitoring wells permit depth discrete ground-water samples to be taken? (Y/N) U aquifer system not defined
b. Are the samples representative of ground-water quality? (Y/N) U
c. Are the ground-water monitoring wells structurally stable? (Y/N) Y
d. Does the ground-water monitoring well's design and construction permit an accurate assessment of aquifer characteristics? (Y/N) U aquifer system not defined

5. Detection Monitoring

a. Downgradient Wells
Do the location, and screen lengths of the ground-water monitoring wells or clusters in the detection monitoring system allow the immediate detection of a release of hazardous waste or constituents from the hazardous waste management area to the uppermost aquifer? (Y/N) U aquifer system poorly defined

b. Upgradient Wells
Do the location and screen lengths of the upgradient (background) ground-water monitoring wells ensure the capability of collecting ground-water samples representative of upgradient (background) ground-water quality including any ambient heterogenous chemical characteristics? (Y/N) U - see text

6. Assessment Monitoring (Facility currently in detection monitoring)

   a. Has the owner/operator adequately characterized site hydrogeology to determine contaminant migration? (Y/N) N
   b. Is the detection monitoring system adequately designed and constructed to immediately detect any contaminant release? (Y/N) U - see text
   c. Are the procedures used to make a first determination of contamination adequate? (Y/N) N
   d. Is the assessment plan adequate to detect, characterize, and track contaminant migration? (Y/N) – NO PLAN
   e. Will the assessment monitoring wells, given site hydrogeologic conditions, define the extent and concentration of contamination in the horizontal and vertical planes? (Y/N) –
   f. Are the assessment monitoring wells adequately designed and constructed? (Y/N) –
   g. Are the sampling and analysis procedures adequate to provide true measures of contamination? (Y/N) –
   h. Do the procedures used for evaluation of assessment monitoring data result in determinations of the rate of migration, extent of migration, and hazardous constituent composition of the contaminant plume? (Y/N) –
   i. Are the data collected at sufficient frequency and duration to adequately determine the rate of migration? (Y/N) –
   j. Is the schedule of implementation adequate? (Y/N) –
   k. Is the owner/operator's assessment monitoring plan adequate? (Y/N) –
      o If the owner/operator had to implement his assessment monitoring plan, was it implemented satisfactorily? (Y/N) –

II. Field Evaluation

A. Ground-water monitoring system:
   Are the numbers, depths, and locations of monitoring wells in agreement with those reported in the facility's monitoring plan? (See Section 3.2.3) (Y/N) U depths not verified

B. Monitoring well construction:
   1. Identify construction material

	Material	Diameter
a. Primary Casing	PVC	2 inch
b. Secondary or outside casing	–	–

2. Is the upper portion of the borehole sealed with concrete to prevent infiltration from the surface? (Y/N) Y

3. Is the well fitted with an above-ground protective device? Locking cap, protective outer casing (Y/N) Y

4. Is the protective cover fitted with locks to prevent tampering? (Y/N) Y

If a facility utilizes more than a single well design, answer the above questions for each well design.

III. Review of Sample Collection Procedures NOT OBSERVED; CONSULTANT NOT PRESENT DURING FIELD OBSERVATION

A. Measurement of well depths elevation:

1. Are measurements of both depth to standing water and depth to the bottom of the well made? (Y/N) U

2. Are measurements taken to the 0.01 feet? (Y/N) U

3. What device is used?

____

4. Is there a reference point established by a licensed surveyor? (Y/N) U

5. Is the measuring equipment properly cleaned between well locations to prevent cross contamination? (Y/N) U

B. Detection of immiscible layers:

1. Are procedures used which will detect light phase immiscible layers? (Y/N) U

2. Are procedures used which will detect heavy phase immiscible layers? (Y/N) U

C. Sampling of immiscible layers:

1. Are the immiscible layers sampled separately prior to well evacuation? (Y/N) U

2. Do the procedures used minimize mixing with water soluble phases? (Y/N) U

D. Well evacuation:

1. Are low yielding wells evacuated to dryness? (Y/N) U

2. Are high yielding wells evacuated so that at least three casing volumes are removed? (Y/N) U

3. What device is used to evacuate the wells?

____

4. If any problems are encountered (e.g., equipment malfunction) are they noted in a field logbook? (Y/N) ___

E. Sample withdrawal: NOT OBSERVED, details not available, consultant not present during field inspection

1. For low yielding wells, are samples for volatiles, pH, and oxidation/reduction potential drawn first after the well recovers? (Y/N) U

2. Are samples withdrawn with either flurocarbon/resins or stainless steel (316, 304 or 2205) sampling devices? (Y/N) U

3. Are sampling devices either bottom valve bailers or positive gas displacement bladder pumps? (Y/N) U

4. If bailers are used, is fluorocarbon/resin coated wire, single strand stainless steel wire, or monofilament used to raise and lower the bailer? (Y/N) U

5. If bladder pumps are used, are they operated in a continuous manner to prevent aeration of the sample? (Y/N) U

6. If bailers are used, are they lowered slowly to prevent degassing of the water? (Y/N) U

7. If bailers are used, are the contents transferred to the sample container in a way that minimizes agitation and aeration? (Y/N) U

8. Is care taken to avoid placing clean sampling equipment on the ground or other contaminated surfaces prior to insertion into the well? (Y/N) U

9. If dedicated sampling equipment is not used, is equipment disassembled and thoroughly cleaned between samples? (Y/N) U

10. If samples are for inorganic analysis, does the cleaning procedure include the following sequential steps:
    a. Dilute acid rinse (HNO_3 or HCl)? (Y/N) U

11. If samples are for organic analysis, does the cleaning procedure include the following sequential steps:
    a. Nonphosphate detergent wash? (Y/N) U
    b. Tap water rinse? (Y/N) U

c. Distilled/deionized water rinse? (Y/N) Y
d. Acetone rinse? (Y/N) Y
e. Pesticide-grade hexane rinse? (Y/N) Y

12. Is sampling equipment thoroughly dry before use? (Y/N) Y

13. Are equipment blanks taken to ensure that sample cross-contamination has not occurred? (Y/N) Y

14. If volatile samples are taken with a positive gas displacement bladder pump, are pumping rates below 100 ml/min? (Y/N) Y

F. In-situ or field analyses:

1. Are the following labile (chemically unstable) parameters determined in the field:
   a. pH? (Y/N) Y
   b. Temperature? (Y/N) Y
   c. Specific conductivity? (Y/N) Y
   d. Redox potential? (Y/N) Y
   e. Chlorine? (Y/N) Y
   f. Dissolved oxygen? (Y/N) Y
   g. Turbidity? (Y/N) Y
   h. Other (specify) __________

2. For in-situ determinations, are they made after well evacuation and sample removal? (Y/N) Y

3. If sample is withdrawn from the well, is parameter measured from a split portion? (Y/N) Y

4. Is monitoring equipment calibrated according to manufacturers' specifications and consistent with SW-846? (Y/N) Y

5. Is the date, procedure, and maintenance for equipment calibration documented in the field logbook? (Y/N) Y

IV. Review of Sample Preservation and Handling Procedures - Details not available, Consultant not present during field inspection

A. Sample containers:

1. Are samples transferred from the sampling device directly to their compatible containers? (Y/N) Y

2. Are sample containers for metals (inorganics) analyses polyethylene with polypropylene caps? (Y/N) Y

3. Are sample containers for organics analysis glass bottles with fluorocarbonresin-lined caps? (Y/N) Y

4. If glass bottles are used for metals samples are the caps fluorocarbonresin-lined? (Y/N) Y

5. Are the sample containers for metal analyses cleaned using these sequential steps?
   a. Nonphosphate detergent wash? (Y/N) Y
   b. 1:1 nitric acid rinse? (Y/N) Y
   c. Tap water rinse? (Y/N) Y
   d. 1:1 hydrochloric acid rinse? (Y/N) Y
   e. Tap water rinse? (Y/N) Y
   f. Distilled/deionized water rinse? (Y/N) Y

6. Are the sample containers for organic analyses cleaned using these sequential steps?
   a. Nonphosphate detergent/hot water wash? (Y/N) Y
   b. Tap water rinse? (Y/N) Y
   c. Distilled/deionized water rinse? (Y/N) Y
   d. Acetone rinse? (Y/N) Y
   e. Pesticide-grade hexane rinse? (Y/N) Y

7. Are trip blanks used for each sample container type to verify cleanliness? (Y/N) Y

B. Sample preservation procedures:

1. Are samples for the following analyses cooled to 4°C:
   a. TOC? (Y/N) Y
   b. TOX? (Y/N) Y
   c. Chloride? (Y/N) Y
   d. Phenols? (Y/N) Y
   e. Sulfate? (Y/N) Y
   f. Nitrate? (Y/N) Y
   g. Coliform bacteria? (Y/N) Y
   h. Cyanide? (Y/N) Y
   i. Oil and grease? (Y/N) Y
   j. Hazardous constituents (§261, Appendix VIII)? (Y/N) Y

2. Are samples for the following analyses field acidified to pH <2 with HNO_3:
   a. Iron? (Y/N) Y
   b. Manganese? (Y/N) Y
   c. Sodium? (Y/N) Y
   d. Total metals? (Y/N) Y
   e. Dissolved metals? (Y/N) Y
   f. Fluoride? (Y/N) Y
   g. Endrin? (Y/N) Y
   h. Lindane? (Y/N) Y
   i. Methoxychlor? (Y/N) Y
   j. Toxaphene? (Y/N) Y

k. 2,4, D? (Y/N) U
l. 2,4,5, TP Silvex? (Y/N) U
m. Radium? (Y/N) U
n. Gross alpha? (Y/N) U
o. Gross beta? (Y/N) U

3. Are samples for the following analyses field acidified to pH <2 with H_2SO_4: (Y/N) U
   a. Phenols? (Y/N) U
   b. Oil and grease? (Y/N) U

4. Is the sample for TOC analyses field acidified to pH <2 with HCl? (Y/N) U

5. Is the sample for TOX analysis preserved with 1 ml of 1.1 M sodium sulfite? (Y/N) U

6. Is the sample for cyanide analysis preserved with NaOH to pH >12? (Y/N) U

C. Special handling considerations:
   1. Are organic samples handled without filtering? (Y/N) U

   2. Are samples for volatile organics transferred to the appropriate vials to eliminate headspace over the sample? (Y/N) U

   3. Are samples for metal analysis split into two portions? (Y/N) U

   4. Is the sample for dissolved metals filtered through a 0.45 micron filter? (Y/N) U

   5. Is the second portion not filtered and analyzed for total metals? (Y/N) U

   6. Is one equipment blank prepared each day of ground-water sampling? (Y/N) U

V. Review of Chain-of-Custody Prodecures Information unavailable - Consultant not present during field inspection

A. Sample labels
   1. Are sample labels used? (Y/N) U

   2. Do they provide the following information:
      a. Sample identification number? (Y/N) U
      b. Name of collector? (Y/N) U
      c. Date and time of collection? (Y/N) U
      d. Place of collection? (Y/N) U
      e. Parameter(s) requested and preservatives used? (Y/N) U

3. Do they remain legible even if wet? (Y/N) U

B. Sample seals:
1. Are sample seals placed on those containers to ensure the samples are not altered? (Y/N) U

C. Field logbook: *Not observed; Consultant not present during inspection*
1. Is a field logbook maintained? (Y/N) U

2. Does it document the following:
a. Purpose of sampling (e.g., detection or assessment)? (Y/N) U
b. Location of well(s)? (Y/N) U
c. Total depth of each well? (Y/N) U
d. Static water level depth and measurement technique? (Y/N) U
e. Presence of immiscible layers and detection method? (Y/N) U
f. Collection method for immiscible layers and sample identification numbers? (Y/N) U
g. Well evacuation procedures? (Y/N) U
h. Sample withdrawal procedure? (Y/N) U
i. Date and time of collection? (Y/N) U
j. Well sampling sequence? (Y/N) U
k. Types of sample containers and sample identification number(s)? (Y/N) U
l. Preservative(s) used? (Y/N) U
m. Parameters requested? (Y/N) U
n. Field analysis data and method(s)? (Y/N) U
o. Sample distribution and transporter? (Y/N) U
p. Field observations? (Y/N) U
o Unusual well recharge rates? (Y/N) U
o Equipment malfunction(s)? (Y/N) U
o Possible sample contamination? (Y/N) U
o Sampling rate? (Y/N) U

D. Chain-of-custody record:
1. Is a chain-of-custody record included with each sample? (Y/N) U
2. Does it document the following:
a. Sample number? (Y/N) U
b. Signature of collector? (Y/N) U
c. Date and time of collection? (Y/N) U
d. Sample type? (Y/N) U
e. Station location? (Y/N) U
f. Number of containers? (Y/N) U
g. Parameters requested? (Y/N) U
h. Signatures of persons involved in the chain-of-possession? (Y/N) U
i. Inclusive dates of possession? (Y/N) U

E. Sample analysis request sheet:

1. Does a sample analysis request sheet accompany each sample? (Y/N) U

2 Does the request sheet document the following:
   a. Name of person receiving the sample? (Y/N) U
   b. Date of sample receipt? (Y/N) U
   c. Laboratory sample number (if different than field number)? (Y/N) U
   d. Analyses to be performed? (Y/N) U

VI. Review of Quality Assurance/Quality Control NOT AVAILABLE FOR INSPECTION

A. Is the validity and reliability of the laboratory and field generated data ensured by a QA/QC program? (Y/N) U

B. Does the QA/QC program include:

1. Documentation of any deviations from approved procedures? (Y/N) U

2. Documentation of analytical results for:
   a. Blanks? (Y/N) U
   b. Standards? (Y/N) U
   c. Duplicates? (Y/N) U
   d. Spiked samples? (Y/N) U
   e. Detectable limits for each parameter being analyzed? (Y/N) U

C. Are approved statistical methods used? (Y/N) U

D. Are QC samples used to correct data? (Y/N) U

E. Are all data critically examined to ensure it has been properly calculated and reported? (Y/N) U

VII. Surficial Well Inspection and Field Observation

A. Are the wells adequately maintained? (Y/N) U

B. Are the monitoring wells protected and secure? (Y/N) U

C. Do the wells have surveyed casing elevations? (Y/N) U

D. Are the ground-water samples turbid? (Y/N) U

E. Have all physical characteristics of the site been noted in the inspector's field notes (i.e., surface waters, topography, surface features)? (Y/N) U

F. Has a site sketch been prepared by the field inspector with a scale, north arrow, location(s) of buildings, location(s) of regulated units, location of monitoring wells, and a rough depiction of the site drainage pattern? (Y/N) U

VIII. Conclusions

A. Is the facility currently operating under the correct monitoring program according to the statistical analyses performed by the current operator? (Y/N) N

B. Does the ground-water monitoring system, as designed and operated, allow for detection or assessment of any possible ground-water contamination caused by the facility? (Y/N) U

C. Does the sampling and analysis procedures permit the owner/operator to detect and, where possible, assess the nature and extent of a release of hazardous constituents to ground water from the monitored hazardous waste management facili . (Y/N) U

APPENDIX A-1

FACILITY INSPECTION FORM FOR COMPLIANCE WITH INTERIM STATUS STANDARDS COVERING GROUND-WATER MONITORING

Company Name: American Steel Foundaries; EPA I.D. Number: ____________

Company Address: ____________; Inspector's Name: ____________
Smith Township
Mahoning County, Ohio

Company Contact/Official: ____________; Branch/Organization: ____________

Title: ____________; Date of Inspection: ____________

	Yes	No	Unknown
Type of facility: (check appropriately)			
a) surface impoundment	✓	___	
b) landfill	✓	___	
c) land ~~treatment~~ disposal facility	✓	___	
d) storage facility	___	___	

Ground-Water Monitoring Plan

	Yes	No	Unknown
1. Has a ground-water monitoring plan been submitted to the Regional Administrator for facilities containing a surface impoundment, landfill, land treatment process, or storage facility?	✓	___	___
2. Was the ground-water monitoring plan reviewed prior to site visit? If "No",	✓	___	
a) Was the ground-water plan reviewed at the facility prior to actual site inspection? If "No", explain.	___	✓	

Facility consultant not made available for discussion.

	Yes	No	Unknown	
3. Has a ground-water monitoring program (capable of determining the facility's impact on the quality of groundwater in the uppermost aquifer underlying the facility) been implemented? 265.90(a)	___	✓	___	see text of report
4. Has at least one monitoring well been installed in the uppermost aquifer hydraulically upgradient from the limit of the waste management area? 265.91(a)(1)	___	___	✓	see text of report
a) Are sufficient ground-water samples from the uppermost aquifer, representative of background ground-water quality and not affected by the facility, ensured by proper well				aquifer system not defined
1) Number(s)?	___	___	✓	
2) Location?	___	___	✓	
3) Depth?	___	___	✓	
5. Have at least three monitoring wells been installed hydraulically downgradient at the limit of the waste handling or management area? 265.91(a)	___	___	✓	
6. Have the locations of the waste handling, storage, or disposal areas been verified to conform with information in the ground-water plan?	✓	___	___	
7. Do the numbers, locations, and depths of the ground-water monitoring wells agree with the data in the ground-water monitoring system program? If "No", explain discrepancies.	___	___	✓	depths not verified no consultant available

	Yes	No	Unknown
3. Has a ground-water sampling and analysis plan been developed? 265.92(a)	___	✓	___
a) Has it been followed?	___	___	___
b) Is the plan kept at the facility?	___	___	___
c) Does the plan include procedures and techniques for:			
1) Sample collection?	___	___	
2) Sample preservation?	___	___	
3) Sample shipment?	___	___	
4) Analytical procedures?	___	___	
5) Chain of custody control?	___	___	
9. Are the required parameters in ground-water samples planned to be tested quarterly for the first year? 265.92(b) and 265.92 (c)(1)	___	✓	
a) Are the ground-water samples analyzed for the following:			
1) Parameters characterizing the suitability of the ground-water as a drinking supply? 265.92(b)(1)	___	✓	
2) Parameters establishing ground-water qaulity? 265.92(b)(2)	___	✓	
3) Parameters used as indicators of ground-water contamination? 265.92(b)(2)	___	✓	
(i) Are at least four replicate measurements obtained for each sample? 265.92(c)(2)	___	✓	
(ii) Are provisions made to calculate the initial background arithmetic mean and variance of the respective parameter concentrations or values obtained from well(s) during the first year? 265.92(c)(2)	___	✓	
b) For facilities which have complied with first year ground-water sampling and analysis requirements:	N/A		
1) Have samples been obtained and analyzed for the ground-water qaulity parameters at least annually? 265.92(d)(1)	___	___	
2) Have samples been obtained and analyzed for the indicators of ground-water contamination at least semi-annually? 265.92(d)(2)	___	___	

	Yes	No	Unknown
c) Were ground-water surface elevations determined at each monitoring well each time a sample was taken? 265.92(e)			
d) Were the ground-water surface elevations evaluated to determine whether the monitoring wells are properly placed? 265.93(f)			
e) If it was determined that modification of the number, location or depth of monitoring wells was necessary, was the system brought into compliance with 265.91(a)? 265.93(f)			
10. Has an outline of a ground-water quality assessment program been prepared? 265.93(a)		✓	
a) Does it describe a program capable of determining:			
1) Whether hazardous waste or hazardous waste constituents have entered the ground water?			
2) The rate and extent of migration of hazardous waste or hazardous waste constituents?			
3) Concentrations of hazardous waste or hazardous waste constituents in in ground water?			
b) Have at least four replicate measurements of each indicator parameter been obtained for samples taken for each well? 265.93(b)		✓	
1) Were the results compared with the initial background mean?			
(i) Was each well considered individually?			
(ii) Was the Student's t-test used (at the 0.01 level of significance)?			
2) Was a significant increase (or pH decrease) found in the:			
(i) Upgradient wells			
(ii) Downgradient wells			

If "Yes", Compliance Checklist A-2 must also be completed.

	Yes	No	Unknown
11. Have records been kept of analyses for parameters establishing ground-water quality and indicators of ground-water contamination? 265.94(a)(1)	✓		
12. Have records been kept of ground-water surface elevations taken at the time of sampling for each well? 265.94(a)(1)		✓	
13. Have the following been submitted to the Regional Administrator 265.94(a)(2) :			
a) Initial background concentrations of parameters listed in 265.92(b) within 15 days after completing each quarterly analysis required during the first year?		✓	
b) For each well, any parameters whose concentrations or values have exceeded the maximum contaminant levels allowed in drinking water supplies?		✓	
c) Annual reports including:			
1) Concentrations or values of parameters used as indicators of ground-water contamination for each well?		✓	
2) Results of the evaluation of ground-water surface elevations?		✓	

APPENDIX B

Water Well Logs
in the Vicinity of

The American Steel Foundry,

Sebring Disposal Facility,

Smith Township, Mahoning County, Ohio.

150

ORIGINAL

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus, Ohio 43212

Nº 367066

E USE PENCIL
YPEWRITER
NOT E INK

152

ty Mahoning Township Smith Section of Township

r Phillip Porter Address 535 Hescock Rd.

tion of property Halfway between Rt. 173 & Lake Park Blvd.

CONSTRUCTION DETAILS 6½"–5"

diameter 6½" To 5" Length of casing 42 ft 155

f screen Length of screen

f pump ¾ H Submersible

ty of pump 10 G.P.M.

of pump setting 220'

f completion Oct 20, 1967

BAILING OR PUMPING TEST

Pumping Rate 10 G.P.M. Duration of test 2 hrs.

Drawdown 152' ft. Date Oct 20, 1967

Static level-depth to water 47' ft.

Quality (clear, cloudy, taste, odor) clear

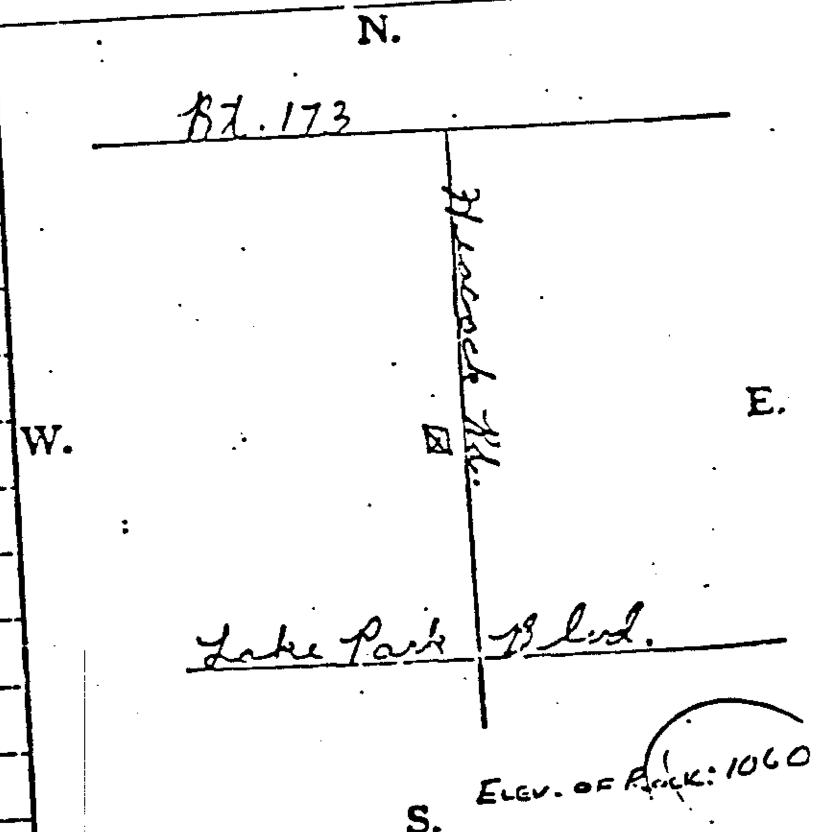
Pump installed by Davidson's Well Dri

WELL LOG*

Formations (sandstone, shale, limestone, gravel and clay)	From	To
	0 Feet	20 Ft.
clay		
clay & gravel	20	35
coal	35	40
fire clay	40	43
dark gray shale	43	75
gray sandrock	75	90
gray shale with coal	90	113
limestone	113	116
gray shale	116	145
limestone	145	149
gray shale set 5" casing	149	155
lt. gray shale	155	178
dark gray shale	178	190

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



ELEV. OF ROCK: 1060

See reverse side for instructions

Drilling Firm Davidson's Well Drill Date Oct 20, 1967

Address 13600 State St. N.E. Signed John L. Davidson

...use next consecutive numbered form

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
1562 W. First Avenue
Columbus, Ohio 43212

№ 367067

...SE USE PENCIL
...TYPEWRITER
...NOT USE INK

...ty Washington Township Smith Section of Township

...er Phillip Carter Address Peacock Rd.

...ation of property

CONSTRUCTION DETAILS

...diameter 6½" to 5" Length of casing

...of screen Length of screen

...of pump

...ity of pump

...of pump setting

...of completion

BAILING OR PUMPING TEST

Pumping Rate G.P.M. Duration of test hrs.

Drawdown ft. Date

Static level-depth to water ft.

Quality (clear, cloudy, taste, odor)

Pump installed by

WELL LOG*

Formations ...ndstone, shale, limestone, gravel and clay	From	To
	0 Feet	Ft.
limestone	190	196
shelly shale	196	208
gray sandrock	208	224
...gray shelly shale	224	232
white sandrock	232	263
...ft water		

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.

N.

W. E.

S.

See reverse side for instructions

Drilling Firm Davidson's Well Drill Date 10-20-67

Signed

Address

*If additional space is needed to complete well log, use next consecutive numbered form

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
65 S. Front St., Rm. 815 Phone (614) 469-2646
Columbus, Ohio 43215

430992

CARBON PAPER NECESSARY— SELF-TRANSCRIBING

County Mahoning Township Smith Section of Township 938-2518

Owner Lee Lynn Mobile Home Sales Address Beloit, O.

Location of property Between Sebring & Beloit on Rt. 173 Older 173: OHIO Ave. East

CONSTRUCTION DETAILS (8") (6¼") (49') (190')

Casing diameter (8" & 6 ¼") Length of casing

Type of screen Length of screen

Type of pump

Capacity of pump

Depth of pump setting

Date of completion

BAILING OR PUMPING TEST
(Specify one by circling)

Test Rate 16 G.P.M. Duration of test 12 hrs

Drawdown 252 ft. Date 3-31-72

Static level-depth to water 22 ft.

Quality (clear, cloudy, taste, odor) Clear

Pump installed by Davidson's

WELL LOG*

Formations sandstone, shale, limestone, gravel and clay	From	To
	0 Feet	9 Ft.
Clay	9	25
Sand	25	46
Clay & gravel	46	47
Blk Limestone	47	76
Shale	76	83
Sandy Shale	83	99
gr. sandrock	99	120
" Shale	120	123
k. gr. "	123	130
gr. limestone	130	139
sandy shale	139	144
k. gr. limestone	144	161
" sandy shale		

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections,

N.

W.

S.

Drilling Firm DAVIDSON'S WELL DRILLING 1330 STATE ST. N. E. ALLIANCE, OHIO 44601

Address

Date 4-8-72

Signed John L. Davidson

*If additional space is needed to complete well log, use next consecutive numbered form

WELL ...

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
65 S. Front St., Rm. 815 Phone (614) 469-2646
Columbus, Ohio 43215

430993

CARBON PAPER
NECESSARY—
F-TRANSCRIBING

Lee Lynn
262

...ty M h. Township Smith Section of Township

...r Lee Lynn Address

...tion of property

CONSTRUCTION DETAILS

diameter Length of casing
...f screen Length of screen
...f pump
...ty of pump
...of pump setting
...of completion

BAILING OR PUMPING TEST
(Specify one by circling)

Test Rate G.P.M. Duration of test hrs
Drawdown ft. Date
Static level-depth to water ft.
Quality (clear, cloudy, taste, odor)

Pump installed by

WELL LOG*

Formations ...ndstone, shale, limestone, gravel and clay	From 0 Feet	To Ft.
...ck slate	161	166
...gr. sandy shale	166	169
...d coal	169	170
...ack limestone	170	171
sandy shale with streaks of limestone	171	232
...h. sandrock-3gpm	232	245
...gr. sandy shale ...th light streaks of coal & water	245	268
...lack slate	268	271
...gr. shale	271	327
...r. & gr. shale	327	341

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.

N.

W. E.

S.

Date 4-8-...-72

Drilling Firm DAVIDSON'S WELL DRILLING ... ALLIANCE, OHIO 44601

Signed John L. Davidson

Address

*If additional space is needed to complete well log, use next consecutive numbered form

ORIGINAL
ORIGINAL

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
65 S. Front St., Rm. 815 Phone (614) 469-2646
Columbus, Ohio 43215

430994

[NO] CARBON PAPER NECESSARY—[SE]LF-T[RA]NSCRIBING

LEF ...
393

[Cou]nty Mah. Township Smith Section of Township
[Ow]ner Lee Lynn Address
[Loc]ation of property

CONSTRUCTION DETAILS

[Casin]g diameter Length of casing
[Type] of screen Length of screen
[Type] of pump
[Capac]ity of pump
[Length] of pump setting
[Date] of completion

BAILING OR PUMPING TEST
(Specify one by circling)

Test Rate G.P.M. Duration of test hrs
Drawdown ft. Date
Static level-depth to water ft.
Quality (clear, cloudy, taste, odor)

Pump installed by

WELL LOG*

Formations [Sa]ndstone, shale, limestone, gravel and clay	From	To
	0 Feet	Ft.
Sandrock	341	344
gr. sandy shale	344	388
[Li]mestone	388	390
[Sa]ndy limestone	390	398
-188' is 8" hole		
?'-398' is 6¼" hole		
[6¼]" casing is plastic coated.		

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.

N.
W. E.
S.

[D]rilling Firm DAVIDSON'S WELL DRILLING 13600 STATE ST. N. E. ALLIANCE, OHIO 44601

[A]ddress

Date 4-8-[illegible]-72

Signed John R Davidson

ORIGINAL

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Water
65 S. Front St., Rm. 815 Phone (614) 469-2646
Columbus, Ohio 43215

448854

CARBON PAPER NECESSARY— SELF-TRANSCRIBING

County MAHONING Township SMITH Section of Township

938-6876

Owner GRACE BARDO Address 286 LAKE PARK BLVD. SEBRING OHIO 44672

Location of property 1000' SOUTH OF JOHNSON RD. ON LAKE PARK BLVD.

CONSTRUCTION DETAILS

Casing diameter 6" Length of casing 60'

Type of screen Length of screen

Type of pump SUBMERSIBLE

Capacity of pump 5 GPM

Depth of pump setting 15'

Date of completion 10-16-72

BAILING OR PUMPING TEST
(Specify one by circling)

Test Rate 2 G.P.M. Duration of test hrs.

Drawdown ft. Date

Static level-depth to water ft.

Quality (clear, cloudy, taste, odor)

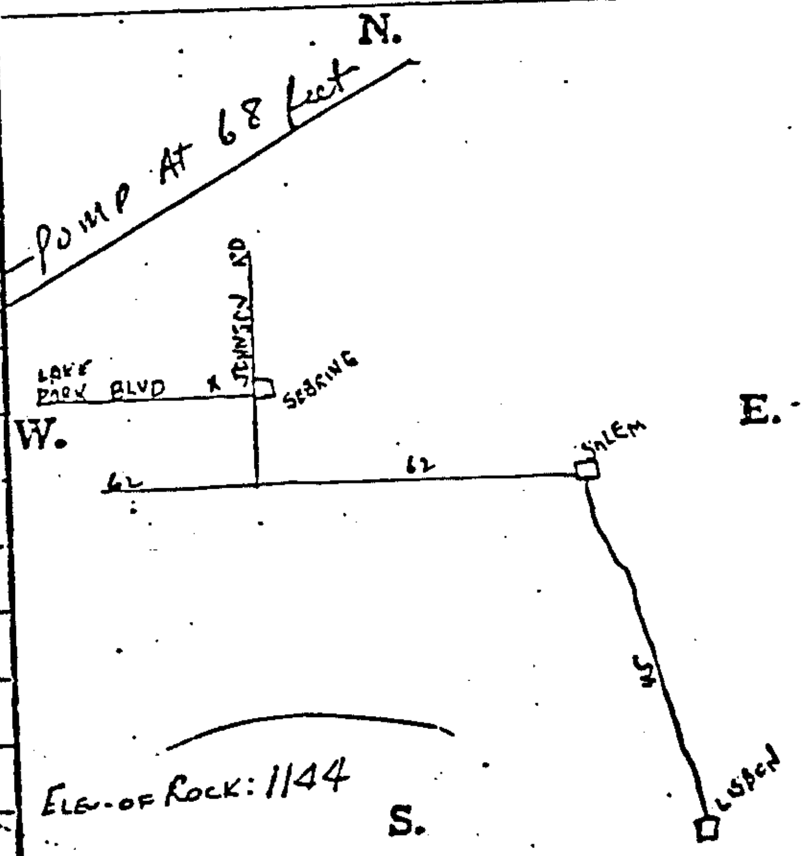
Pump installed by DRILLER

WELL LOG*

Formations sandstone, shale, limestone, gravel and clay	From	To
	0 Feet	5 Ft.
SOIL	5	45
SHALE	45	48
[illegible]	48	55
CLAY	55	100
SHALE	100	120
SANDSTONE	120	140
SHALE	140	150
SANDSTONE	150	170
SHALE		

SKETCH SHOWING LOCATION

Locate in reference to numbered State Highways, St. Intersections, County roads, etc.



Drilling Firm SMITH DRILLING CO INC Date 10-16-72

Address LISBON, OHIO Signed Earl Smith

If additional space is needed to complete well log, use next consecutive numbered form.

DRILLER'S COPY

WELL LOG AND DRILLING REPORT

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Geological Survey
Fountain Square
Columbus, Ohio 43224 Phone (614) 466-5344

477145

CAR-_N PAPER NECESSARY— LF-TRANSCRIBING

Y Mahoning TOWNSHIP Smith SECTION OF TOWNSHIP OR LOT NUMBER

[illegible] ADDRESS [illegible]

[illegible]

ION OF PROPERTY On Lake Park Dr [illegible] W of Johnson Rd

CONSTRUCTION DETAILS

ameter 6" Length of casing 43 ft

reen Length of screen

ump Diesel [illegible]

of pump

pump setting

ompletion 4-22-76

BAILING OR PUMPING TEST

(specify one by circling)

Test rate 7 gpm Duration of test 24 hrs

Drawdown 80 ft Date 4-23-76

Static level (depth to water) 45 ft

Quality (clear, cloudy, taste, odor) [illegible]

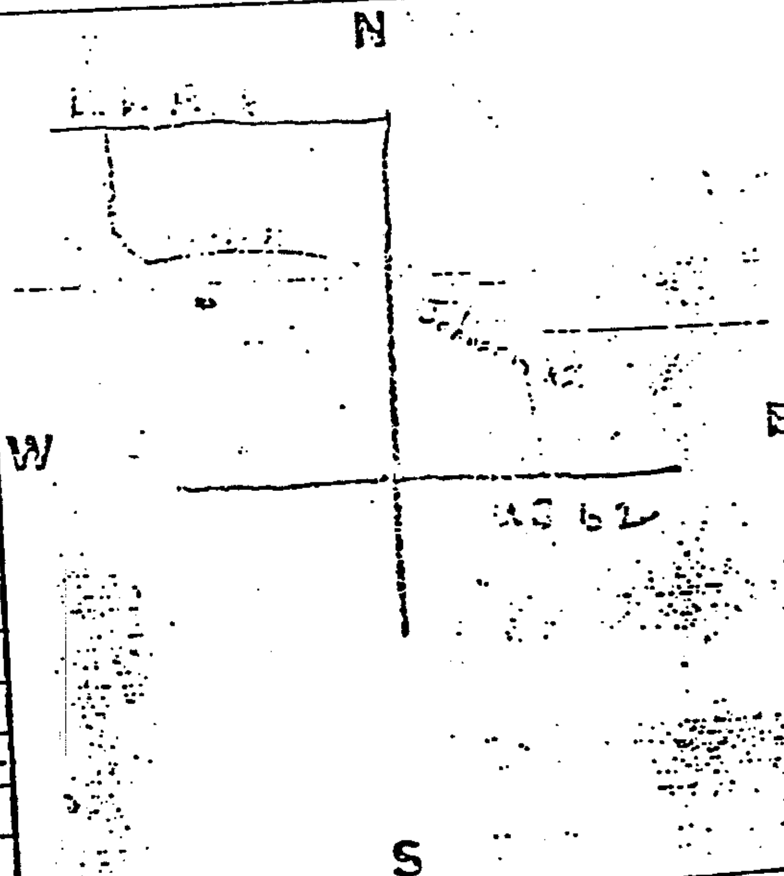
Pump installed by [illegible]

WELL LOG*

Formations: sandstone, shale, limestone, gravel, clay	From	To
	0 ft	40 ft
[illegible]	40	42
[illegible] Clay	42	50
[illegible] Shale	50	63
[illegible] Shale	63	70
[illegible] Shale	70	85
White Shale	85	98
[illegible] Shale	98	104
White Shale	104	131
[illegible] Shale	131	133
[illegible] Rock	133	159
[illegible] Shale	159	162
[illegible] Rock	162	172
White Shale		
		85 ft
Water		

SKETCH SHOWING LOCATION

Locate in reference to numbered state highways, street intersections, county roads, etc.



DRILLING FIRM [illegible] DATE 4-22-76

[illegible] SIGNED [illegible]

WELL LOG AND DRILLING REPORT

ORIGINAL

State of Ohio
DEPARTMENT OF NATURAL RESOURCES
Division of Geological Survey
Fountain Square
Columbus, Ohio 43224 Phone (614) 466-5344

481343

D CARBON PAPER
NECESSARY—
ELF-T NSCRIBING

TY Mahoning TOWNSHIP Smith SECTION OF TOWNSHIP OR LOT NUMBER

R [illegible] Sam Rowe AD RESS 805 Lake Park Sebring

TION OF PROPERTY same

CONSTRUCTION DETAILS	
iameter 5	Length of casing 29 Ft.
screen	Length of screen
pump	
of pump	
pump setting	
completion	

BAILING OR PUMPING TEST (specify one by circling)

Air blown

Test rate 4 gpm Duration of test 1 hrs

Drawdown 200 ft Date May 23 1975

Static level (depth to water) 70 ft

Quality (clear, cloudy, taste, odor) cloudy no odor

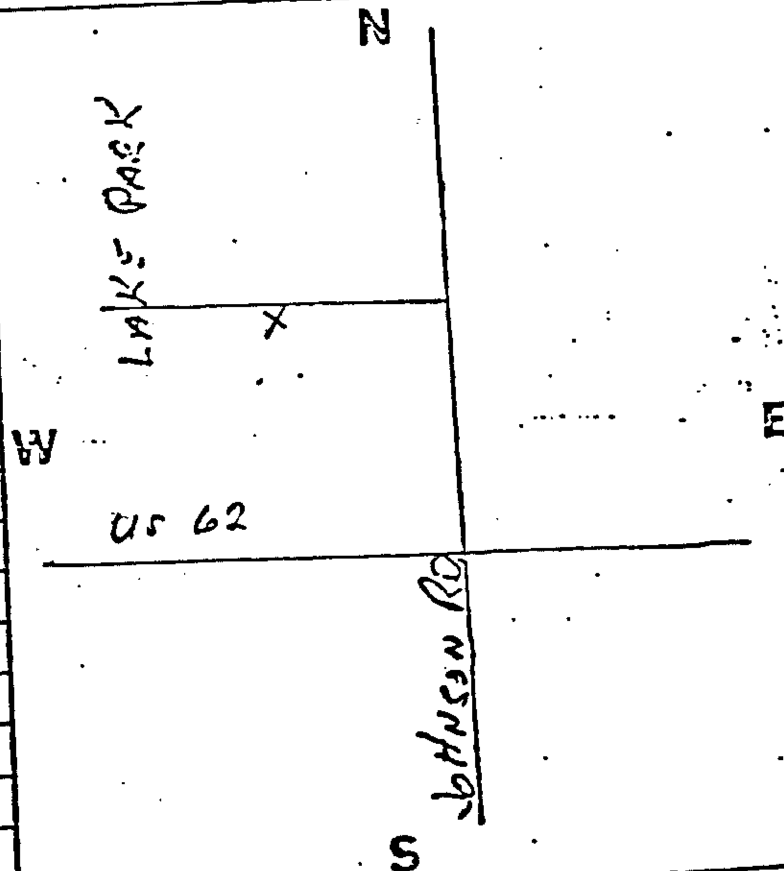
Pump installed by

WELL LOG*

ormations: sandstone, shale, limestone, gravel, clay	From	To
shale	0 ft	15 ft
shale	15	20
shale	20	25
sandy shale	25	30
shale	30	55
[illegible]	55	57
shale	57	63
sandy shale & limestone	63	78
shale	78	81
	81	82
shale	82	85
rock	85	220
bed	220	230
shale & rock	230	290
& white sandstone with blue shale	290	320

SKETCH SHOWING LOCATION

Locate in reference to numbered state highways, street intersections, county roads, etc.



DRILLING FIRM A.B.CULP DRILLING CO.

ADDRESS LOUISVILLE, OHIO

DATE JUNE 2 1973

SIGNED A.B. Culp Drilling

DRILLING, INC.
I , 2, Darlington, Pa. 16115

ecumseh Village

Location Alliance For Tecumseh Village

Date Fb. 5, 1973

Driller P Ortz

Log of Test Hole No.

Type of Formation	Ft.	In.	T
Soil	2		
d	2		
dstone	47		
dy Shale	7		
dstone	10		
l		42	
y	7½		
dy shale	16		
le	11		
l		36	
y	3		
dy shale	20		
ite	17		
l		24	
y	4		
le	24		
l		24	
y	3		
ndstone	6		
ale	20		
ndstone	15		

(2)

DRILLING, INC.
R.D. 2, Darlington, Pa. 16115

MAY 3 1978

Location Alliance

Date Fb. 5, 1973

Driller P Ortz

Log of Test Hole No.

Type of Formation	Ft.	In.	Total Depth
Shale	54		
Sandstone	6		
Shale	31		
Sandstone	29		345'

116' casing

8" hole

Memo

FROM McKAY & GOULD DRILLING, INC.

April 28, 1978

Don Heuer Ohio E.P.A.

Enclosed is the log on the test hole that we drilled at Tecumseh Village Feb. 5, 1973. I do not have anything on the pumping test. As I recall, a gentleman by the name of Kerm Riffle of Salem, Ohio, should have the information on the test pumping.

Sorry I can't be of more help on this.

Respectfully,

Jack Gould
President

APPENDIX C

Boring Logs

American Steel Foundry,

Sebring Disposal Facility,

Smith Township, Mahoning County, Ohio.

LOG OF BORING NO. 1

AMERICAN STEEL FOUNDRIES, ALLIANCE, OHIO, LAKE PARK ROAD PROJECT

BORING LOCATION: As shown on boring location plan DATE STARTED: 7/10/85

SURFACE ELEVATION: 1117.70' DATE COMPLETED: 7.11/85

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6"	"N" BLOWS /Ft. OR CORE REC.
0.0' – 4.5'	Hard brown silt, some sand - moist	1A 1C	1.0- 2.5 3.0- 5.0	17-19-24	43 24"
4.5' – 12.8 (10')	Weathered rock	2A 1B	5.0- 6.5 9.0-14.0	17-29-36	65 23"
12.8 – 27.8' (20')	Siltstone, light gray, sandy, with numerous shaley partings, micaceous (Flasser bedding), moderate to highly weathered, moderately soft, iron-stained, broken (Gradational contact at 27.0')	2B 3B	14.0-19.0 19.0-28.0		52" 38"
27.8' – 28.8' (30')	Shale, gray, silty, micaceous, thinly bedded, moderately weathered, soft	4B	28.0-38.0		83"
28.8' – 38.0'	Clay shale, highly weathered, very soft (Underclay)				
38.0' – 55.0' (40', 50')	Shale, grades to light gray, with some sandy and freshwater limestone members 1' to 2' thick	5B 6B	38.0-47.0 47.0-55.0		105" 96"
(60')	Bottom of boring at 55.0'				

	WATER OBSERVATIONS	TYPE SAMPLER
METHOD: HOLLOW STEM AUGER	INITIAL DEPTH: None	X A. SPLIT-SPOON
TECHNICIAN: RG-RH	COMPLETION DEPTH: 32.4'	X B. "NX" WIRELINE
JOB NO. 28458 (bw)	DEPTH AFTER: ____ HRS. ____	X C. SHELBY TUBE

BOWSER MORNER

LOG OF BORING NO. 2

AMERICAN STEEL FOUNDRIES, ALLIANCE, OHIO, LAKE PARK ROAD PROJECT

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7/09/85

DATE COMPLETED: 7/10/85

SURFACE ELEVATION: 10[illegible].86'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6"	"N" BLOWS /Ft. OR CORE REC.
0.0'	(FILL) Strip spoil - damp	1A	1.0- 2.5	4- 5- 7	12
		2A	4.0- 5.5	3- 5- 6	11
		3A	6.5- 8.0	4- 4- 8	12
		1C	9.0-11.0		
10'		4A	11.0-12.5	4- 7- 8	15
		5A	14.0-15.5	4- 4- 6	10
		6A	19.0-20.5	6- 7- 8	15
20'	(Becomes wet at 19.0')	7A	24.0-25.5	4- 8-12	20
		8A	29.0-30.5	7-17- 9	26
30'		9A	34.0-35.5	6- 7-18	25
	Bottom of boring at 35.5'				
40'					
50'					
60'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RG-RH

JOB NO. 28458 (bw)

WATER OBSERVATIONS

INITIAL DEPTH: 26.0'

COMPLETION DEPTH: None

DEPTH AFTER: ____ HRS. ____

TYPE SAMPLER

X A. SPLIT-SPOON

__ B.

X C. SHELBY TUBE

BOWSER MORNER

LOG OF BORING NO. 3

AMERICAN STEEL FOUNDRIES, ALLIANCE, OHIO, LAKE PARK ROAD PROJECT

BORING LOCATION: As shown on boring location plan

DATE STARTED: 7/10/85

DATE COMPLETED: 7/10/85

SURFACE ELEVATION: 1084.65'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6"	"N" BLOWS /Ft. OR CORE REC.
0.0'	(FILL) Strip spoil - moist	1A	1.0- 2.5	9- 7-14	21
		2A	4.0- 5.5	6- 7- 9	16
		3A	6.5- 8.0	5- 5- 6	11
		4A	9.0-10.5	3- 4- 5	9
10'					
		5A	14.0-15.5	7- 9- 8	17
		6A	19.0-20.5	4- 8- 9	17
20'					
		1C	23.0-25.0		11"
		7A	25.0-26.5	4- 4-11	15
30'	Bottom of boring at 26.5'				
40'					
50'					
60'					

METHOD: HOLLOW STEM AUGER

TECHNICIAN: RG-RH

JOB NO. 28458 (bw)

WATER OBSERVATIONS

INITIAL DEPTH: 14.5'

COMPLETION DEPTH: 7.0'

DEPTH AFTER: 24 HRS. ____

TYPE SAMPLER

X A. SPLIT-SPOON

___ B.

X C. SHELBY TUBE

BOWSER MORNER

LOG OF BORING NO. 4

AMERICAN STEEL FOUNDRIES, ALLIANCE, OHIO, LAKE PARK ROAD PROJECT

BORING LOCATION: As shown on boring location plan DATE STARTED: 7/09/85

SURFACE ELEVATION: 1076.85' DATE COMPLETED: 7/09/85

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6"	"N" BLOWS /Ft. OR CORE REC.
0.0'					
0.5'	(FILL) Foundry sand - dry				
	(FILL) Very stiff brown and gray silt, some clay, some sand - moist (Spoil)	1A	1.0- 2.5	4-10-14	24
	(Becomes soft at 4.0')	2A	4.0- 5.5	3- 2- 2	4
10'	(Becomes stiff at 6.5')	3A	6.5- 8.0	3- 4- 7	11
	(Becomes medium stiff at 9.0')	4A	9.0-10.5	4- 3- 5	8
	(Becomes stiff at 14.0')	5A	14.0-15.5	4- 4- 7	11
20'		6A	19.0-20.5	5- 5- 7	12
		7A	24.0-25.5	7- 8-11	19
30'	(Becomes hard at 28.5')	8A	28.5-30.0	8-15-20	35
	Bottom of boring at 30.0'				
40'					
50'					
60'					

	WATER OBSERVATIONS	TYPE SAMPLER
METHOD: HOLLOW STEM AUGER	INITIAL DEPTH: 8.0'	X A. SPLIT-SPOON
TECHNICIAN: RG-RH	COMPLETION DEPTH: 8.0'	B.
JOB NO. 28458 (bw)	DEPTH AFTER: 24 HRS.	C. SHELBY TUBE

BOWSER MORNER

LOG OF BORING NO. 5

AMERICAN STEEL FOUNDRIES, ALLIANCE, OHIO, LAKE PARK ROAD PROJECT

BORING LOCATION: As shown on boring location plan DATE STARTED: 7/08/85

DATE COMPLETED: 7/09/85

SURFACE ELEVATION: 1081.0'

STRATUM	DESCRIPTION OF MATERIAL	SAMPLE NO. & TYPE	SAMPLE DEPTH	BLOWS PER 6"	"N" BLOWS /Ft. OR CORE REC.
0.0'	(FILL) Mill refuse, foundry sand - dry	1A	1.0- 2.5	7- 7-11	18
	(Becomes loose at 4.0')	2A	4.0- 5.5	3- 2- 2	4
	(Becomes medium dense, with large chunks at 6.5')	3A	6.5- 8.0	4- 4- 7	11
10'	(Becomes wet at 8.0')	4A	9.0-10.5	6- 7- 5	12
	(Becomes loose at 14.0')	5A	14.0-15.5	2- 2- 3	5
		1C	16.5-18.0		24"
20'	(Becomes medium dense at 18.5')	6A	18.5-20.0	2- 5- 6	11
		7A	24.0-25.5	7-10-14	24
30'	(Becomes dense at 29.0')	8A	29.0-30.5	9-21-22	43
		9A	34.0-35.5	11-16-19	35
40'		10A	39.0-40.5	7-14-20	34
42.0'	(ORIGINAL) Gray shale	11A	43.0-43.5	100	100
	Bottom of boring at 43.5'				
50'					
60'					

METHOD: HOLLOW STEM AUGER	WATER OBSERVATIONS	TYPE SAMPLER
TECHNICIAN: RG-RH	INITIAL DEPTH: 8.0' (heavy)	X A. SPLIT-SPOON
JOB NO. 28458 (bw)	COMPLETION DEPTH: 8.6'	___ B.
	DEPTH AFTER: 24 HRS. 8.6'	X C. SHELBY TUBE

BOWSER MORNER

APPENDIX D

Diagrams of Monitor Well Construction

American Steel Foundry,

Sebring Disposal Facility

Smith Townhip, Mahoning County, Ohio.

LOG OF WELL NO. 1

AMERICAN STEEL FOUNDRIES, ALLIANCE, OHIO, LAKE PARK ROAD PROJECT

BC NG LOCATION: See print
DATE INSTALLED: 7/11/85

SURFACE ELEVATION: 1117.70
TOP OF PIPE ELEVATION: 1120.30

TYPE OF PIEZOMETER: Standpipe 2" Sch. 40 PVC

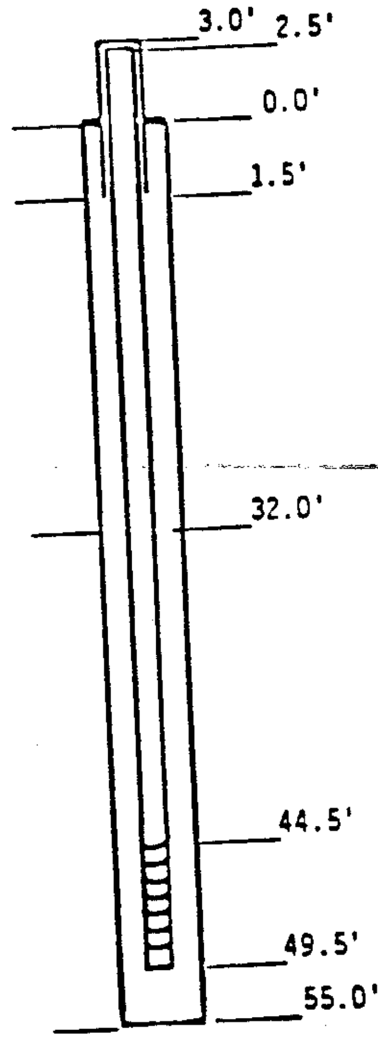
DATE	WATER SURFACE DEPTH (FT.)	WATER SURFACE ELEV. (FT.)		INSTALLATION DESCRIPTION
7/11/85				

DESCRIPTION — DEPTH (FT.)

CEMENT

BENTONITE

SAND



NOTES: Screen length 5.0'
Slot size 0.010
Guard pipe 6"x5' black iron, with locking cap and lock

TECHNICIAN RG-RH

JOB NO. 28458 (bw)

LOG OF WELL NO. 2

AMERICAN STEEL FOUNDRIES, ALLIANCE, OHIO, LAKE PARK ROAD PROJECT

B[illegible]ING LOCATION: See print
DATE INSTALLED: 7/10/85

SURFACE ELEVATION: 1094.86
TOP OF PIPE ELEVATION: 1095.41

TYPE OF PIEZOMETER: Standpipe 2" Sch. 40 PVC

DATE	WATER SURFACE DEPTH (FT.)	WATER SURFACE ELEV. (FT.)		INSTALLATION DESCRIPTION
7/10/85	6.3'			
7/11/85	22.3'		After bailing water returned to 22.3'	

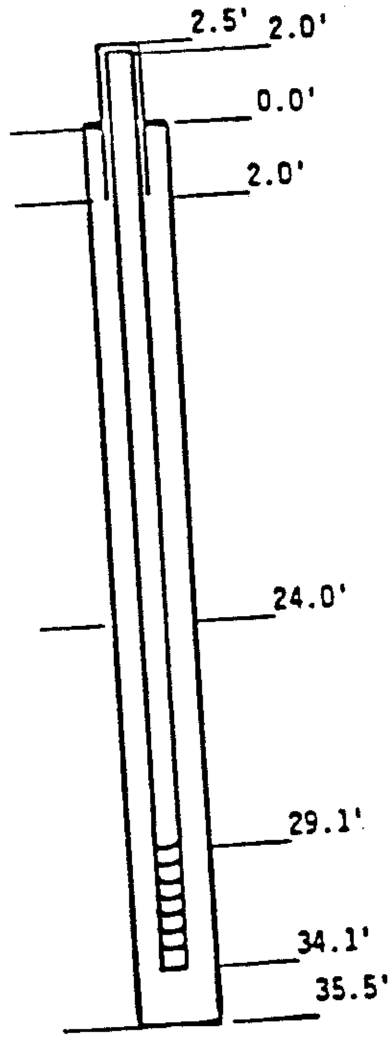
INSTALLATION DESCRIPTION

DESCRIPTION — DEPTH (FT.)

CEMENT

BENTONITE

SAND



TECHNICIAN RG-RH

JOB NO. 28458 (bw)

NOTES: Screen length 5.0'
Slot size 0.010
Guard pipe 6"x5' black iron, with locking cap and lock

LOG OF WELL NO. 3

AMERICAN STEEL FOUNDRIES, ALLIANCE, OHIO, LAKE PARK ROAD PROJECT

E ING LOCATION: See print
DATE INSTALLED: 7/10/85

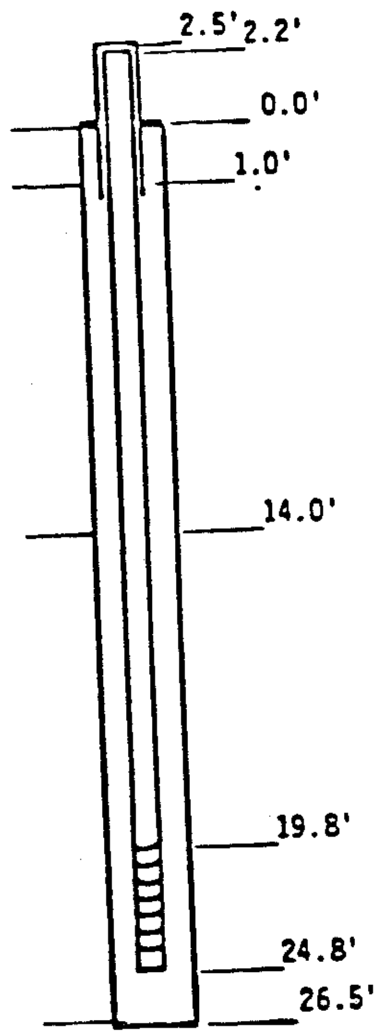
SURFACE ELEVATION: 1084.65
TOP OF PIPE ELEVATION: 1086.85

TYPE OF PIEZOMETER: Standpipe 2" Sch. 40 PVC

DATE	WATER SURFACE DEPTH (FT.)	WATER SURFACE ELEV. (FT.)	
7/10/85	14.5'		
7/11/85	14.3'		After pumping 21.3'

INSTALLATION DESCRIPTION

DESCRIPTION	DEPTH (FT.)
CEMENT	
BENTONITE	
SAND	



TECHNICIAN RG-RH

JOB NO. 28458 (bw)

NOTES: Screen length 5.0'
Slot size 0.010
Guard pipe 6"x5' black iron, with locking cap and lock

LOG OF WELL NO. 4

AMERICAN STEEL FOUNDRIES, ALLIANCE, OHIO, LAKE PARK ROAD PROJECT

BC NG LOCATION: See print
DATE INSTALLED:

SURFACE ELEVATION: 1076.42
TOP OF PIPE ELEVATION: 1079.17

TYPE OF PIEZOMETER: Standpipe 2" Sch. 40 PVC

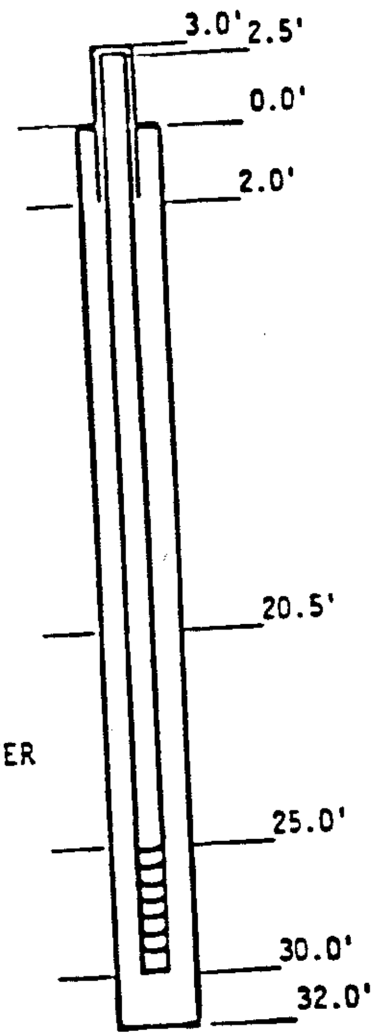
DATE	WATER SURFACE DEPTH (FT.)	WATER SURFACE ELEV. (FT.)	
7/08/85	8.6'		
7/10/85	6.3'		
7/11/85	6.7'		Water returned to 6.7' after pumping for 1/2 hr. at 10 G.R.M.

INSTALLATION DESCRIPTION

DESCRIPTION DEPTH (FT.)

BENTONITE

SAND FILTER



NOTES: Screen lengt.. 5.0'
Slot size 0.010
Guard pipe 6"x5' black iron, with locking cap and lock

TECHNICIAN RG-RH

JOB NO. 28458 (bw)

APPENDIX E

Water Quality Results,

Monitor Well Samplings,

Sebring Disposal Facility,

Smith Township, Mahoning County, Ohio.

BOWSER-MORNER, INC.

CORPORATE: 420 Davis Ave. • P.O. Box 51 • Dayton, OH 45401 • 513/253-8805
TOLEDO DISTRICT: 122 S. St. Clair St. • P.O. Box 838 • Toledo, OH 43696 • 419/255-8200

LABORATORY REPORT

Report to: American Steel Foundry
Attn: Mr. Steve Thrasher
C/O BOWSER-MORNER, ASSOC.
P. O. Box 51
Dayton, OH 45401

Date: 10/05/87
Laboratory No.: 8709169 001
Authorization: WO# 28458
Sample No.: 07994

Report on: One (1) Water Sample Submitted for Analysis.

SAMPLE IDENTIFICATION: ID #1 *Sept. 2, 1987 sampling?*

ANALYTICAL METHODS:

The analysis was performed in accordance with "Standard Methods for the Examination of Water and Wastewater", 16th Edition.

TEST RESULTS:

pH	3.9	
Conductance	1710	micromhos
Alkalinity in Water	0.00	as CaCO3
Total Dissolved Solids	1360	mg/L
Chlorine	84	mg/L
Sulfate	740	mg/L
Nitrate	0.71	mg/L
Detergents, MBAS	0.1	mg/L
Total Kjeldahl Nitrogen	0.9	mg/L
Nitrogen Ammonia	0.6	mg/L
Chemical Oxygen Demand	13	mg/L
Phosphorus	<0.2	mg/L
Calcium	190	mg/L
Sodium	75.0	mg/L
Iron	178.00	mg/L
Chromium	0.02	mg/L
Magnesium	69.00	mg/L
Potassium	14.50	mg/L
Zinc	1.01	mg/L
Cadmium	0.01	mg/L
Lead	<0.02	mg/L
Total Organic Carbon	4.0	mg/l
Barium	<5	mg/L
Arsenic	<0.004	mg/L
Mercury	<0.001	mg/L
Selenium	<0.004	mg/L
Silver	<0.01	mg/L

Respectfully Submitted,

BOWSER-MORNER, INC.

James M. Kemper

James M. Kemper
Chemist
Analytical Sciences Division

JMK/PKC
1 -Client
2 -File

All samples recovered for this project will be retained at this laboratory for a period of 30 days unless we are informed to the contrary.

BOWSER MORNER

BOWSER-MORNER, INC.

CORPORATE: 420 Davis Ave. • P.O. Box 51 • Dayton, OH 45401 • 513/253-8805
TOLEDO DISTRICT: 122 S. St. Clair St. • P.O. Box 838 • Toledo, OH 43696 • 419/255-8200

LABORATORY REPORT

Report to: American Steel Foundry
Attn: Mr. Steve Thrasher
C/O BOWSER-MORNER, ASSOC.
P. O. Box 51
Dayton, OH 45401

Date: 10/05/87
Laboratory No.: 8709169 002
Authorization: WO# 28458

Sample No.: 07995

Report on: One (1) Water Sample Submitted for Analysis.

SAMPLE IDENTIFICATION: ID #2

Sept. 2, 1987 sampling?

ANALYTICAL METHODS:

The analysis was performed in accordance with "Standard Methods for the Examination of Water and Wastewater", 16th Edition.

TEST RESULTS:

pH	4.6	
Conductance	3480	micromhos
Alkalinity in Water	10	as CaCO3
Total Dissolved Solids	3940	mg/L
Chlorine	33	mg/L
Sulfate	2500	mg/L
Nitrate	0.29	mg/L
Detergents, MBAS	0.1	mg/L
Total Kjeldahl Nitrogen	6.0	mg/L
Nitrogen Ammonia	6.2	mg/L
Chemical Oxygen Demand	43	mg/L
Phosphorus	0.40	mg/L
Calcium	300	mg/L
Sodium	37.0	mg/L
Iron	273.00	mg/L
Chromium	0.02	mg/L
Magnesium	198.00	mg/L
Potassium	6.50	mg/L
Zinc	1.28	mg/L
Cadmium	0.01	mg/L
Lead	<0.02	mg/L
Total Organic Carbon	16.3	mg/l
Barium	<5	mg/L
Arsenic	<0.002	mg/L
Mercury	<0.001	mg/L
Selenium	<0.002	mg/L
Silver	<0.01	mg/L

Respectfully Submitted,

BOWSER-MORNER, INC.

James M. Kemper

James M. Kemper
Chemist
Analytical Sciences Division

JMK/PKC
1 -Client
2 -File

All samples recovered for this project will be retained at this laboratory for a period of 30 days unless we are informed to the contrary.

BOWSER MORNER

Water Sampling Field Data Record Sheet

Technician(s) JS

Job No. 28458

Time 245

Location No. 2

Blank No.

Date(s) 9-2-87

Additional notes (especially weather) on back yes/no

WELL DATA:

Type Water Pipe PVC

Diameter Water Pipe 2"

Condition of Guard Pipe, Lock, Water Pipe, Etc:

good

Depth of Well: 36.87

Depth of Water: 26.34

Height of Water: 10.53

Volume of Water in Well: 1.6 gal ($V= 3.14\ r^2h$)

Measured from:

Top of Guard Pipe:

Top of Water Pipe: x

Top of Ground:

EVACUATION DATA:

yes/no Dedicated Equipment

X Bailer ___ Pump ___ Airlift ___ Other

Volume Removed or Time Pumped:

7 gallons

Equipment Cleaned: X Field ___ Lab

X Distilled Water ___ Sample Water Flowers Acetone HNO_3 Other

SAMPLING DATA:

Date Sampled 9-2-87 Time 245

Color Brown (silty)

Odor None

pH		4.73			
pH Buffer	7.04/4.00	7.04			
at Temperature	14	14			
Conductivity uMHOS/cm		2350			
at Temperature		14			

Samples Collected:

Preservative	Volume	Parameters	Filtered	Iced	Lab No.
HNO_3	1QT		Yes	Yes	Bowser
H_2SO_4	1QT		No	Yes	
None	1QT		No	Yes	

BOWSER MORNER

BOWSER-MORNER, INC.

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TOLEDO DISTRICT: 122 S. St. Clair St. • P.O. Box 838 • Toledo, OH 43696 • 419/255-8200

LABORATORY REPORT

Report to: American Steel Foundry
Attn: Mr. Steve Thrasher
C/O BOWSER-MORNER, ASSOC.
P. O. Box 51
Dayton, OH 45401

Date: 10/05/87
Laboratory No.: 8709169 003
Authorization: WO# 28458
Sample No.: 07996

Report on: One (1) Water Sample Submitted for Analysis.

SAMPLE IDENTIFICATION: ID #3

Sept. 2, 1987 sampling?

ANALYTICAL METHODS:

The analysis was performed in accordance with "Standard Methods for the Examination of Water and Wastewater", 16th Edition.

TEST RESULTS:

pH	6.3	
Conductance	2730	micromhos
Alkalinity in Water	376	as CaCO3
Total Dissolved Solids	2200	mg/L
Chlorine	129	mg/L
Sulfate	950	mg/L
Nitrate	0.69	mg/L
Detergents, MBAS	0.2	mg/L
Total Kjeldahl Nitrogen	1.0	mg/L
Nitrogen Ammonia	0.8	mg/L
Chemical Oxygen Demand	12	mg/L
Phosphorus	<0.2	mg/L
Calcium	290	mg/L
Sodium	410	mg/L
Iron	18	mg/L
Chromium	0.02	mg/L
Magnesium	161	mg/L
Potassium	11.0	mg/L
Zinc	0.09	mg/L
Cadmium	0.01	mg/L
Lead	<0.02	mg/L
Total Organic Carbon	3.8	mg/l
Barium	<5	mg/L
Arsenic	<0.002	mg/L
Mercury	<0.001	mg/L
Selenium	<0.002	mg/L
ilver	<0.01	mg/L

Respectfully Submitted,

BOWSER-MORNER, INC.

James M. Kemper

James M. Kemper
Chemist
Analytical Sciences Division

JMK/PKC
1 -Client
2 -File

All samples recovered for this project will be retained at this laboratory for a period of 30 days unless we are informed to the contrary.

Water Sampling Field Data Record Sheet

Technician(s) JS
Job No. 28455
Time 400
Location No. 3
Blank No.
Date(s) 9-2-87
Additional notes (especially weather) on back yes/no

WELL DATA:
Type Water Pipe PVC
Diameter Water Pipe 2"

Condition of Guard Pipe, Lock, Water Pipe, Etc:
good

Depth of Well: 27.04
Depth of Water: 17.44
Height of Water: 9.6
Volume of Water in Well: 1.5 gal (V= 3.14 r^2h)

Measured from:
Top of Guard Pipe:
Top of Water Pipe: x
Top of Ground:

yes/no Dedicated Equipment

EVACUATION DATA:
x Bailer ___ Pump ___ Airlift ___ Other

Volume Removed or Time Pumped: 5 gallons

Equipment Cleaned: X Field ___ Lab

x Distilled Water x Sample Water Alconox, Acetone, HNO_3 Other

SAMPLING DATA:
Date Sampled 9-2-87 Time 415
Color Tan
Odor None

pH		6.46			
pH Buffer	7.04	7.04			
at Temperature	14	19			
Conductivity uMHOS/cm		1875			
at Temperature		14			

Samples Collected:

Preservative	Volume	Parameters	Filtered	Iced	Lab No.
HNO_3	1 QT		YES	YES	Bowser
H_2SO_4	1 QT		No	YES	
None	1 QT		No	YES	

BOWSER MORNER

BOWSER-MORNER, INC.

CORPORATE: 420 Davis Ave. • P.O. Box 51 • Dayton, OH 45401 • 513/253-8805
TOLEDO DISTRICT: 122 S. St. Clair St. • P.O. Box 838 • Toledo, OH 43696 • 419/[illegible]5-8200

LABORATORY REPORT

Report to:
American Steel Foundry
Attn: Mr. Steve Thrasher
C/O BOWSER-MORNER, ASSOC.
P. O. Box 51
Dayton, OH 45401

Date: 10/05/87
Laboratory No.: 8709169 004
Authorization: WO# 28458

Sample No.: 07997

Report on: One (1) Water Sample Submitted for Analysis.

SAMPLE IDENTIFICATION: ID #4

Sept. 2, 1987 sampling?

ANALYTICAL METHODS:

The analysis was performed in accordance with "Standard Methods for the Examination of Water and Wastewater", 16th Edition.

TEST RESULTS:

	6.4	
pH	1310	micromhos
Conductance	275	as CaCO3
Alkalinity in Water	874	mg/L
Total Dissolved Solids	36	mg/L
Chlorine	430	mg/L
Sulfate	0.16	mg/L
Nitrate	0.1	mg/L
Detergents, MBAS	2.1	mg/L
Total Kjeldahl Nitrogen	1.1	mg/L
Nitrogen Ammonia	5.7	mg/L
Chemical Oxygen Demand	<0.2	mg/L
Phosphorus	160	mg/L
Calcium	45	mg/L
Sodium	13	mg/L
Iron	<0.01	mg/L
Chromium	54	mg/L
Magnesium	6.0	mg/L
Potassium	0.09	mg/L
Zinc	0.01	mg/L
Cadmium	<0.02	mg/L
Lead	<3.0	mg/l
Total Organic Carbon	<5	mg/L
Barium	<0.002	mg/L
Arsenic	<0.001	mg/L
Mercury	<0.002	mg/L
Selenium	<0.01	mg/L
Silver		

Respectfully Submitted,

BOWSER-MORNER, INC.

James M. Kemper

James M. Kemper
Chemist
Analytical Sciences Division

JMK/PKC
1 -Client
2 -File

All samples recovered for this project will be retained at this laboratory for a period of 30 days unless we are informed to the contrary.

BOWSER MORNER

Water Sampling Field Data Record Sheet

Technician(s) JS
Location No. 4
Blank No.
Job No. 29458
Date(s) 9-3-87
Time 845
Additional notes (especially weather) on back yes/no

WELL DATA:
Type Water Pipe PVC
Diameter Water Pipe 2"

Condition of Guard Pipe, Lock, Water Pipe, Etc:
9/2/87 - well lock Had been Shot several times And would NOT open
9/3/87 - old lock cut off + Replaced w/ new one by ASF
Note: ASF has key

Depth of Well: 31.74
Depth of Water: 9.86
Height of Water: 21.88
Volume of Water in Well: 3.5 ($V= 3.14\ r^2h$)

Measured from:
Top of Guard Pipe: x
Top of Water Pipe:
Top of Ground:

EVACUATION DATA:
yes/no Dedicated Equipment
✓ Bailer ____ Pump ____ Airlift ____ Other

Volume Removed or Time Pumped:

12 gallons Removed

Equipment Cleaned: x Field ____ Lab
x Distilled Water x Sample Water Alconox, Acetone, HNO_3 Other

SAMPLING DATA:
Date Sampled 9-3-87 Time 9:00
Color Clear
Odor None

pH		6.47			
pH Buffer	7.04	7.04			
at Temperature	15	15			
Conductivity uMHOS/cm		875			
at Temperature		15			

Samples Collected:

Preservative	Volume	Parameters	Filtered	Iced	Lab No.
HNO_3	1 qt		Yes	Yes	Bowser
H_2SO_4	1 qt		No	Yes	
None	1 qt		No	Yes	

BOWSER MORNER

BOWSER-MORNER, INC.

CORPORATE. 420 Davis Ave. • P.O. Box 51 • Dayton, OH 45401 • 513/253-8805
TOLEDO DISTRICT: 122 S. St Clair St. • P.O. Box 838 • Toledo, OH 43696 • 419/255-8200

LABORATORY REPORT

Report to American Steel Foundry
% Dept. 27 BOWSER-MORNER, INC.
Attn: Mr. Steve Thrasher

Date: October 14, 1985
Laboratory No.: R 091938
Authorization:

Report on: Four (4) well water samples for chemical analysis, received September 19, 1985.

SAMPLE IDENTIFICATION:

The samples were identified as Wells 1 through 4.

TEST METHODS:

The analyses were performed in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition. The samples were filtered before metals analyses.

TEST RESULTS:

See attached detail sheet.

Respectfully Submitted,

BOWSER-MORNER, INC.

James M. Kemper

James M. Kemper, Chemist
Analytical Sciences Division

1-Client
2-File
JMK/pc

All samples recovered from this project will be retained at this laboratory for a period of 30 days unless we are informed to the contrary.

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TOLEDO DISTRICT: 122 S. St. Clair St. • P.O. Box 838 • Toledo, OH 43696 • 419/255-8200

LABORATORY REPORT

Report to: American Steel Foundry
C/O BMA
Attn: Mr. Steve Thrasher

Date: September 15, 1986
Laboratory No.: S090255
Authorization:

Report on: Nine (9) Water Samples for Analysis, Received August 29, 1986.

SAMPLE IDENTIFICATION:

The samples were identified as Ponds 1, 2, and 3; Wells 1, 2, 3, and 4; Upstream, and Downstream.

ANALYTICAL METHODS:

The analyses were performed in accordance with Standard Methods for the Examination of Water and Wastewater, 16th Edition.

TEST RESULTS:

See attached sheets.

Respectfully Submitted,

BOWSER-MORNER, INC.

James M. Kemper

James M. Kemper
Chemist
Analytical Sciences Division

JMK/lu
1-Client
2-File

All samples recovered for this project will be retained at this laboratory for a period of 30 days unless we are informed to the contrary.

American Steel Foundry
Page 3.
b. Report No. S090255

Aug. 29, 1986 ?

	Well 1	Well 2	Well 3	Well 4
pH	5.6	5.2	7.2	7.0
Conductivity, μmhos/cm	2080	3370	2600	2630
Alkalinity to pH 4.5, mg/l as $CaCO_3$	5.0	10	365	199
Total Dissolved Solids, mg/l	1950	3990	2440	1150
Chloride, mg/l	97	35	140	25
Sulfate, mg/l	1300	2700	1200	640
Nitrate-Nitrogen, mg/l	<0.1	1.8	11	1.3
MBAS, mg/l	0.1	0.1	0.1	0.1
Total Kjeldahl Nitrogen, mg/l	26	19	2.0	2.0
Ammonia-Nitrogen, mg/l	1.0	3.0	0.5	0.8
Chemical Oxygen Demand, mg/l	23	53	<10	<10
Phosphorus, mg/l	<0.1	<0.1	<0.1	<0.1
Phenol, mg/l	0.020	<0.005	<0.005	0.030
Calcium, mg/l	260	360	340	190
Sodium, mg/l	52	18	110	28
Iron, mg/l	175	245	9.0	6.5
Chromium, mg/l	<0.01	0.02	0.01	0.02
Magnesium, mg/l	88	180	170	76
Potassium, mg/l	9.0	15	22	16
Zinc, mg/l	0.94	1.2	1.1	0.08
Cadmium, mg/l	<0.01	<0.01	<0.01	<0.01
Lead, mg/l	<0.02	<0.02	<0.02	<0.02
Total Organic Carbon, mg/l	6.7	11.3	7.8	6.2

- Continued -

(EXAMPLE #3)

BOWSER MORNER

FOUNDED 1911

420 Davis Ave. • P.O. Box 51 • Dayton, OH 45401 • 513/253-8805

CHAIN OF CUSTODY

DESTINATION: BMI
Chemistry Dept.

Job No. 28458

CLIENT ASF

TRANSPORT METHOD Auto

Cooler Number: 6/1/2)

Sample Numbers: Well #'s 1,2,3,4. Pond #'s 1,2,3 Steam - Upgradient - Downgradient
(9 SAMPLES)

ALL PERSONS HANDLING THIS ITEM PLEASE FILL OUT BELOW IMMEDIATELY AS RECEIVED.

I Dave Q— Terry Macada Mike Williams sampled the water on 08-29-86 (date) at ~9:00 - 12:00 AM (time).

I ____ of ____ received the samples for transport/____ (other reason) on ____ (date) at ____ (time).

I ____ of ____ received the samples for transport/____ (other reason) on ____ (date) at ____ (time).

I ____ of ____ received the samples for transport/____ (other reason) on ____ (date) at ____ (time).

I Marjorie N. Regh of Bowser-Morner received/placed the samples for processing in the BOWSER-MORNER laboratory/____ (other; specify) on 8-29-86 (date) at 5:00 (time).

BOWSER-MORNER, INC.
Testing Division

BOWSER-MORNER ASSOCIATES, INC.
Engineering Division

Other Locations:
122 S. St. Clair St. • P.O. Box 838 • Toledo, OH 43696 • 419/255-8200
169 E. Reynolds Rd. • P.O. Box 24289 • Lexington, KY 40524 • 606/273-9111

WATER SAMPLING FIELD DATA RECORD SHEET

Technician(s) - Terry Mosoda Location: ____ Well # #1

Job No. 28458 ____ Surface ____

Date 8-29-86 Time 11:30 AM

American Steel Foundries

Type Water Pipe: ____ 1 1/4" PVC X 2" PVC ____ 4" PVC ____ Stainless
____ Iron ____ New House ____ Old House ____ Other

Type of Cap: X Guard Pipe ____ Mueller Friction Cap X Padlock ____ Other

Taken from:
Top of Guard Pipe ____
Top of Water Pipe X
Top of Ground ____

Depth to Water 35.0'

Depth of Well: 51.3'

51.3 - 35 = 16.3 → 1 well volume = 2.7 gallons
2.7 × 3 = 8.1

Evacuation Method:
____ Teflon Bailer X PVC Bailer ____ Submersible Pump ____ Pitcher Pump ____ Other

Yes/no Dedicated Equipment

Volume Removed or Time Pumped: 10 Gallons

Field Cleaning Equipment:
____ None X Distilled Water ____ Steam ____ Other, Explain

Sampling:
Temperature: ____ pH ____ Conductivity: ____

Color: ____ Odor: ____

		Iced?
Amount of Unpreserved Sample Collected	1.5 l	X
Amount of H_2SO_4 Preserved Sample Collected		
Amount of HNO_3 Preserved Sample Collected		
Other Preservative		
Coliform - DON'T TOUCH WATER		

Notes: Problem/Discrepancies - use back of page if needed. Sketches are helpful.

BOWSER-MORNER

WATER SAMPLING FIELD DATA RECORD SHEET

Technician(s) Terry Mosada Location: ____ Well #2

Job No. 28458 ____ Surface ____

Date 8-29-86 Time 10:11 AM

Type Water Pipe: ____ 1 1/4" PVC X 2" PVC ____ 4" PVC ____ Stainless

____ Iron ____ New House ____ Old House ____ Other

Type of Cap: X Guard Pipe ____ Mueller Friction Cap X Padlock ____ Other

Taken from:

Top of Guard Pipe ____

Top of Water Pipe X

Top of Ground ____

Depth to Water 26'10"

Depth of Well: 35.0'

35.0' - 26'10" = 8'2" → 1.3 gallons

1.3 × 3 = 3.9

1.3 × 8 = 10.4

Evacuation Method:

____ Teflon Bailer X PVC Bailer ____ Submersible Pump ____ Pitcher Pump ____ Other

Yes/no Dedicated Equipment

Volume Removed or Time Pumped: 6 Gallons

Field Cleaning Equipment:

____ None X Distilled Water ____ Steam ____ Other, Explain

Sampling:

Temperature: (or 49°F) pH ____ Conductivity: ____

Color: ____ Odor: ____

		Iced?
Amount of Unpreserved Sample Collected	1.5 l	X
Amount of H_2SO_4 Preserved Sample Collected		
Amount of HNO_3 Preserved Sample Collected		
Other Preservative		
Coliform - DON'T TOUCH WATER		

Notes: Problem/Discrepancies - use back of page if needed. Sketches are helpful.

BOWSER-MORNER

WATER SAMPLING FIELD DATA RECORD SHEET

Technician(s) Terry Masada   Location: ____   Well #3

Job No. 28958   ____ Surface ____

Date 8-29-86   Time 9:45 AM

Type Water Pipe: ___ 1 1/4" PVC   X 2" PVC   ___ 4" PVC   ___ Stainless

___ Iron   ___ New House   ___ Old House   ___ Other

Type of Cap: X Guard Pipe   ___ Mueller Friction Cap   X Padlock   ___ Other

Depth to Water 18.0'

Taken from:
Top of Guard Pipe ___
Top of Water Pipe X
Top of Ground ___

Depth of Well: 27.0'

Evacuation Method:

___ Teflon Bailer   X PVC Bailer   ___ Submersible Pump   ___ Pitcher Pump   ___ Other

Yes/no/ Dedicated Equipment

Volume Removed or Time Pumped: 6 Gallons

Field Cleaning Equipment:

___ None   X Distilled Water   ___ Steam   ___ Other, Explain

Sampling:

Temperature: (or 50°F)   pH ____   Conductivity: ____

Color: Grey   Odor: None

		Iced?
Amount of Unpreserved Sample Collected	1.5 l	X
Amount of H_2SO_4 Preserved Sample Collected		
Amount of HNO_3 Preserved Sample Collected		
Other Preservative		
Coliform - DON'T TOUCH WATER		

Notes: Problem/Discrepancies - use back of page if needed. Sketches are helpful.

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WATER SAMPLING FIELD DATA RECORD SHEET

echnician(s) Terry Masada Location: ____ Well ✓ #4

Job No. 28458 ____ Surface ____

Date 8-29-86 Time 11:00 AM

Type Water Pipe: ____ 1 1/4" PVC X 2" PVC ____ 4" PVC ____ Stainless
____ Iron ____ New House ____ Old House ____ Other

Type of Cap: X Guard Pipe ____ Mueller Friction Cap X Padlock ____ Other

Taken from:
Top of Guard Pipe ____
Top of Water Pipe X
Top of Ground ____

Depth to Water 10.3'

Depth of Well: 32.0'

32.0 - 10.3 = 21.7 → 1 well volume = 3.5 gallons
3.5 × 3 = 10.5

Evacuation Method:
____ Teflon Bailer Y PVC Bailer ____ Submersible Pump ____ Pitcher Pump ____ Other

Yes/no Dedicated Equipment

Volume Removed or Time Pumped: 12 Gallons

Field Cleaning Equipment:
____ None X Distilled Water ____ Steam ____ Other, Explain

Sampling:
Temperature: 50°F pH ____ Conductivity: ____

Color: ____ Odor: None

		Iced?
Amount of Unpreserved Sample Collected	1.5 l	X
Amount of H_2SO_4 Preserved Sample Collected		
Amount of HNO_3 Preserved Sample Collected		
Other Preservative		
oliform - DON'T TOUCH WATER		

Notes: Problem/Discrepancies - use back of page if needed. Sketches are helpful.

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American Steel Foundry
Page 2
Lab. No. R 091938

Sept. 18, 1985?

TEST RESULTS:

Parameter	Well 1	Well 2	Well 3	Well 4
pH	6.1	5.1	6.9	6.9
Conductivity, µmhos/cm	1400	3180	2690	1050
Alkalinity to pH 4.5, mg/l as $CaCO_3$	<1.0	<1.0	360	214
Ammonia-Nitrogen, mg/l	1.1	0.6	1.7	1.1
Total Kjeldahl Nitrogen, mg/l	7.0	16.8	5.3	4.2
Nitrate-Nitrogen, mg/l	<1.0	<1.0	1.0	<1.0
Sulfate, mg/l	749	2320	921	498
Chloride, mg/l	81	51	213	66
Total Dissolved Solids, mg/l	1310	4010	2260	1240
Chemical Oxygen Demand, mg/l	76	99	38	114
MBAS, mg/l	0.1	0.1	<0.1	0.1
Fluoride, mg/l	1.0	<1.0	1.0	<1.0
Phenol, mg/l	0.005	<0.004	0.022	0.019
Cadmium, mg/l	<0.01	0.01	<0.01	<0.01
Calcium, mg/l	190	370	320	220
Magnesium, mg/l	48	170	130	70
Sodium, mg/l	36	19	130	30
Iron, mg/l	52	180	11	14
Chromium, mg/l	<0.01	<0.01	<0.01	<0.01
Lead, mg/l	0.03	0.07	0.04	0.03
Total Organic Carbon, mg/l	48.4	45.1	94.6	36.2

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LABORATORY REPORT

Aug. 15, 1985

ort to: American Steel Foundry
% BMI Dept. 27
Attn: Mr. Steve Thrasher

Date: August 26, 1985
Laboratory No.: R 08,523
Authorization:

port on: Four (4) well water samples for chemical analysis, received August 15, 1985.

SAMPLE IDENTIFICATION:

The samples were identified as Wells 1 through 4.

ANALYTICAL METHODS:

The analyses were performed in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition.

TEST RESULTS:

	Well 1	Well 2	Well 3	Well 4
pH	5.6	4.6	6.2	6.4
Conductivity, µmhos/cm	800	2300	2280	1170
Total Alkalinity to pH 4.5, mg/l as $CaCO_3$	2	2	420	250
Ammonia Nitrogen, mg/l	1.0	4.0	1.4	1.4
Total Kjeldahl Nitrogen, mg/l	1.7	4.8	2.1	1.7
Nitrate Nitrogen, mg/l	1.3	<1.0	<1.0	<1.0
Sulfate, mg/l	450	2100	1250	560
Chloride, mg/l	21	13	120	35
Total Dissolved Solids, mg/l	730	3340	2660	1120
Chemical Oxygen Demand, mg/l	11.2	59.3	16.3	6.6
Methylene Blue Active Substances, mg/l	0.3	0.1	<0.1	<0.1
Fluorice, mg/l	0.25	1.1	0.40	0.33
Phenol, mg/l	0.030	0.075	0.038	0.020
Cadmium, mg/l	<0.01	0.01	0.01	<0.01
Calcium, mg/l	136	301	350	200
Magnesium, mg/l	50	160	170	55
Sodium, mg/l	53	25	116	35
Iron, mg/l	43	260	16	16
Chromium, mg/l	<0.01	0.05	0.04	0.06
Lead, mg/l	0.10	0.13	0.06	0.06
Total Organic Carbon, mg/l	42.8	721	43.2	13.2

Respectfully Submitted,

BOWSER-MORNER, INC.

James M. Kemper

James M. Kemper, Chemist
Analytical Sciences Division

1-Client
2-File
JMK/pc

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LABORATORY REPORT

Report to: American Steel Foundry
Attn: Mr. Steve Thrasher
C/O BOWSER-MORNER, ASSOC.
P. O. Box 51
Dayton, OH 45401

Date: 10/05/87
Laboratory No.: 8709169 002
Authorization: WO# 28458

Sample No.: 07995

Report on: One (1) Water Sample Submitted for Analysis.

SAMPLE IDENTIFICATION: ID #2

Sept. 2, 1987 sampling?

ANALYTICAL METHODS:

The analysis was performed in accordance with "Standard Methods for the Examination of Water and Wastewater", 16th Edition.

TEST RESULTS:

pH	4.6	
Conductance	3480	micromhos
Alkalinity in Water	10	as CaCO3
Total Dissolved Solids	3940	mg/L
Chlorine	33	mg/L
Sulfate	2500	mg/L
Nitrate	0.29	mg/L
Detergents, MBAS	0.1	mg/L
Total Kjeldahl Nitrogen	6.0	mg/L
Nitrogen Ammonia	6.2	mg/L
Chemical Oxygen Demand	43	mg/L
Phosphorus	0.40	mg/L
Calcium	300	mg/L
Sodium	37.0	mg/L
Iron	273.00	mg/L
Chromium	0.02	mg/L
Magnesium	198.00	mg/L
Potassium	6.50	mg/L
Zinc	1.28	mg/L
Cadmium	0.01	mg/L
Lead	<0.02	mg/L
Total Organic Carbon	16.3	mg/l
Barium	<5	mg/L
Arsenic	<0.002	mg/L
Mercury	<0.001	mg/L
Selenium	<0.002	mg/L
Silver	<0.01	mg/L

Water Sampling Field Data Record Sheet

Technician(s) JS Location No. 2
Job No. 28458 Blank No.
Time 245 Date(s) 9-2-87
Additional notes (especially weather) on back yes/no

WELL DATA:
Type Water Pipe PVC Diameter Water Pipe 2"

Condition of Guard Pipe, Lock, Water Pipe, Etc:
good

Measured from:
Depth of Well: 36.87 Top of Guard Pipe:
Depth of Water: 26.34 Top of Water Pipe: X
Height of Water: 10.53 Top of Ground:
Volume of Water in Well: 1.6 gal (V= 3.14 r^2h)

yes/no Dedicated Equipment

EVACUATION DATA:
X Bailer ___ Pump ___ Airlift ___ Other

Volume Removed or Time Pumped:
7 gallons

Equipment Cleaned: X Field ___ Lab

X Distilled Water ___ Sample Water Alconox, Acetone, HNO_3 Other

SAMPLING DATA: Date Sampled 9-2-87 Time 245
Color Brown (silty) Odor None

pH		4.78			
pH Buffer	7.04/4.00	7.04			
at Temperature	14	14			
Conductivity uMHOS/cm		2350			
at Temperature		14			

Samples Collected:

Preservative	Volume	Parameters	Filtered	Iced	Lab No.
HNO_3	1 QT		Yes	Yes	Bowser
H_2SO_4	1 QT		No	Yes	
None	1 QT		No	Yes	

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LABORATORY REPORT

Report to: American Steel Foundry
Attn: Mr. Steve Thrasher
C/O BOWSER-MORNER, ASSOC.
P. O. Box 51
Dayton, OH 45401

Date: 10/05/87
Laboratory No.: 8709169 003
Authorization: WO# 28458

Sample No.: 07996

Report on: One (1) Water Sample Submitted for Analysis.

SAMPLE IDENTIFICATION: ID #3

Sept. 2, 1987 sampling?

ANALYTICAL METHODS:

The analysis was performed in accordance with "Standard Methods for the Examination of Water and Wastewater", 16th Edition.

TEST RESULTS:

pH	76.3	
Conductance	2730	micromhos
Alkalinity in Water	376	as CaCO3
Total Dissolved Solids	2200	mg/L
Chlorine	129	mg/L
Sulfate	950	mg/L
Nitrate	0.69	mg/L
Detergents, MBAS	0.2	mg/L
Total Kjeldahl Nitrogen	1.0	mg/L
Nitrogen Ammonia	0.8	mg/L
Chemical Oxygen Demand	12	mg/L
Phosphorus	<0.2	mg/L
Calcium	290	mg/L
Sodium	410	mg/L
Iron	18	mg/L
Chromium	0.02	mg/L
Magnesium	161	mg/L
Potassium	11.0	mg/L
Zinc	0.09	mg/L
Cadmium	0.01	mg/L
Lead	<0.02	mg/L
Total Organic Carbon	3.8	mg/l
Barium	<5	mg/L
Arsenic	<0.002	mg/L
Mercury	<0.001	mg/L
Selenium	<0.002	mg/L
Silver	<0.01	mg/L

Respectfully Submitted,

BOWSER-MORNER, INC.

James M. Kemper

James M. Kemper
Chemist
Analytical Sciences Division

JMK/PKC
1 -Client
2 -File

All samples recovered for this project will be retained at this laboratory for a period of 30 days unless we are informed to the contrary.

Water Sampling Field Data Record Sheet

Technician(s) JS Location No. 3
Job No. 28455 Blank No.
Time 400 Date(s) 9-2-87
Additional notes (especially weather) on back yes/no

WELL DATA:
Type Water Pipe PVC Diameter Water Pipe 2"

Condition of Guard Pipe, Lock, Water Pipe, Etc:
good

Measured from:
Depth of Well: 27.04 Top of Guard Pipe:
Depth of Water: 17.44 Top of Water Pipe: x
Height of Water: 9.6 Top of Ground:
Volume of Water in Well: 1.5 gal ($V= 3.14\ r^2h$)

yes/no Dedicated Equipment

EVACUATION DATA:
x Bailer ____ Pump ____ Airlift ____ Other

Volume Removed or Time Pumped: 5 gallons

Equipment Cleaned: X Field ____ Lab

x Distilled Water x Sample Water Alconox, Acetone, HNO_3 Other

SAMPLING DATA: Date Sampled 9-2-87 Time 415
Color Tan Odor None

pH		6.46			
pH Buffer	7.04	7.04			
at Temperature	14	19			
Conductivity uMHOS/cm		1875			
at Temperature		14			

Samples Collected:

Preservative	Volume	Parameters	Filtered	Iced	Lab No.
HNO_3	1 QT		YES	YES	Bowser
H_2SO_4	1 QT		No	YES	
None	1 QT		No	YES	

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LABORATORY REPORT

Report to:
American Steel Foundry
Attn: Mr. Steve Thrasher
C/O BOWSER-MORNER, ASSOC.
P. O. Box 51
Dayton, OH 45401

Date: 10/05/87
Laboratory No.: 8709169 004
Authorization: WO# 28458
Sample No.: 07997

Report on: One (1) Water Sample Submitted for Analysis.

SAMPLE IDENTIFICATION: ID #4

Sept. 2, 1987 sampling?

ANALYTICAL METHODS:

The analysis was performed in accordance with "Standard Methods for the Examination of Water and Wastewater", 16th Edition.

TEST RESULTS:

pH	6.4	
Conductance	1310	micromhos
Alkalinity in Water	275	as CaCO3
Total Dissolved Solids	874	mg/L
Chlorine	36	mg/L
Sulfate	430	mg/L
Nitrate	0.16	mg/L
Detergents, MBAS	0.1	mg/L
Total Kjeldahl Nitrogen	2.1	mg/L
Nitrogen Ammonia	1.1	mg/L
Chemical Oxygen Demand	5.7	mg/L
Phosphorus	<0.2	mg/L
Calcium	160	mg/L
Sodium	45	mg/L
Iron	13	mg/L
Chromium	<0.01	mg/L
Magnesium	54	mg/L
Potassium	6.0	mg/L
Zinc	0.09	mg/L
Cadmium	0.01	mg/L
Lead	<0.02	mg/L
Total Organic Carbon	<3.0	mg/l
Barium	<5	mg/L
Arsenic	<0.002	mg/L
Mercury	<0.001	mg/L
Selenium	<0.002	mg/L
Silver	<0.01	mg/L

Respectfully Submitted,

BOWSER-MORNER, INC.

James M. Kemper

James M. Kemper
Chemist
Analytical Sciences Division

JMK/PKC
1 -Client
2 -File

All samples recovered for this project will be retained at this laboratory for a period of 30 days unless we are informed to the contrary.

BOWSER MORNER

Water Sampling Field Data Record Sheet

Technician(s) JS

Job No. 29458

Time 945

Location No. 4

Blank No.

Date(s) 9-3-87

Additional notes (especially weather) on back yes/no

ELL DATA:

Type Water Pipe PVC

Diameter Water Pipe 2"

Condition of Guard Pipe, Lock, Water Pipe, Etc:

9/2/87 - well lock had been shot several times and would not open

9/3/87 - old lock cut off + replaced w/ new one by ASF

Note: ASF has key

Measured from:

Depth of Well: 31.74

Depth of Water: 9.86

Height of Water: 21.88

Volume of Water in Well: 3.5 $(V = 3.14\ r^2 h)$

Top of Guard Pipe: x

Top of Water Pipe:

Top of Ground:

EVACUATION DATA:

yes/no Dedicated Equipment

✓ Bailer ___ Pump ___ Airlift ___ Other

Volume Removed or Time Pumped:

12 gallons Removed

Equipment Cleaned: x Field ___ Lab

x Distilled Water x Sample Water Alconox, Acetone, HNO_3 Other

SAMPLING DATA:

Date Sampled 9-3-87 Time 9:00

Color Clear

Odor None

pH		6.47			
pH Buffer	7.04	7.04			
at Temperature	15	15			
Conductivity uMHOS/cm		875			
at Temperature		15			

Samples Collected:

Preservative	Volume	Parameters	Filtered	Iced	Lab No.
HNO_3	1 Qt		Yes	Yes	Bowser
H_2SO_4	1 Qt		No	Yes	
None	1 Qt		No	Yes	

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LABORATORY REPORT

Report to American Steel Foundry
% Dept. 27 BOWSER-MORNER, INC.
Attn: Mr. Steve Thrasher

Date: October 14, 1985
Laboratory No.: R 091938
Authorization:

Report on Four (4) well water samples for chemical analysis, received September 19, 1985.

SAMPLE IDENTIFICATION:

The samples were identified as Wells 1 through 4.

TEST METHODS:

The analyses were performed in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition. The samples were filtered before metals analyses.

TEST RESULTS:

See attached detail sheet.

Respectfully Submitted,

BOWSER-MORNER, INC.

James M. Kemper

James M. Kemper, Chemist
Analytical Sciences Division

1-Client
2-File
JMK/pc

All samples recovered from this project will be retained at this laboratory for a period of 30 days unless we are informed to the contrary.

BOWSER-MORNER, INC.

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TOLEDO DISTRICT: 122 S. St. Clair St. • P.O. Box 838 • Toledo, OH 43696 • 419/255-8200

LABORATORY REPORT

Report to: American Steel Foundry
C/O BMA
Attn: Mr. Steve Thrasher

Date: September 15, 1986
Laboratory No.: S090255
Authorization:

Report on: Nine (9) Water Samples for Analysis, Received August 29, 1986.

SAMPLE IDENTIFICATION:

The samples were identified as Ponds 1, 2, and 3; Wells 1, 2, 3, and 4; Upstream, and Downstream.

ANALYTICAL METHODS:

The analyses were performed in accordance with Standard Methods for the Examination of Water and Wastewater, 16th Edition.

TEST RESULTS:

See attached sheets.

Respectfully Submitted,

BOWSER-MORNER, INC.

James M. Kemper

James M. Kemper
Chemist
Analytical Sciences Division

JMK/lu
1-Client
2-File

All samples recovered for this project will be retained at this laboratory for a period of 30 days unless we are informed to the contrary.

American Steel Foundry
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Aug. 29, 1986 ?

	Well 1	Well 2	Well 3	Well 4
pH	5.6	5.2	7.2	7.0
Conductivity, μmhos/cm	2080	3370	2600	2630
Alkalinity to pH 4.5, mg/l as $CaCO_3$	5.0	10	365	199
Total Dissolved Solids, mg/l	1950	3990	2440	1150
Chloride, mg/l	97	35	140	25
Sulfate, mg/l	1300	2700	1200	640
Nitrate-Nitrogen, mg/l	<0.1	1.8	11	1.3
MBAS, mg/l	0.1	0.1	0.1	0.1
Total Kjeldahl Nitrogen, mg/l	26	19	2.0	2.0
Ammonia-Nitrogen, mg/l	1.0	3.0	0.5	0.8
Chemical Oxygen Demand, mg/l	23	53	<10	<10
Phosphorus, mg/l	<0.1	<0.1	<0.1	<0.1
Phenol, mg/l	0.020	<0.005	<0.005	0.030
Calcium, mg/l	260	360	340	190
Sodium, mg/l	52	18	110	28
Iron, mg/l	175	245	9.0	6.5
Chromium, mg/l	<0.01	0.02	0.01	0.02
Magnesium, mg/l	88	180	170	76
Potassium, mg/l	9.0	15	22	16
Zinc, mg/l	0.94	1.2	1.1	0.08
Cadmium, mg/l	<0.01	<0.01	<0.01	<0.01
Lead, mg/l	<0.02	<0.02	<0.02	<0.02
Total Organic Carbon, mg/l	6.7	11.3	7.8	6.2

- Continued -

(EXAMPLE #3)

BOWSER MORNER

FOUNDED 1911

420 Davis Ave. • P.O. Box 51 • Dayton, OH 45401 • 513/253-8805

CHAIN OF CUSTODY

DESTINATION: BMI Chemistry Dept.

Job No. 28458

CLIENT ASF

TRANSPORT METHOD Auto

Cooler Number: 6995 Sample Numbers: Well #1,2,3,4, Pond #'s 1,2,3 Stream – Upgradient – Downgradient (9 SAMPLES)

ALL PERSONS HANDLING THIS ITEM PLEASE FILL OUT BELOW IMMEDIATELY AS RECEIVED.

Doug [illegible] Terry Macada Mike [illegible] sampled the water on 08-29-86 (date) at 9:00 – 12:00 AM (time).

I ________ of ________ received the samples for transport/________ (other reason) on ________ (date) at ________ (time).

I ________ of ________ received the samples for transport/________ (other reason) on ________ (date) at ________ (time).

I ________ of ________ received the samples for transport/________ (other reason) on ________ (date) at ________ (time).

I Marjorie N. Reyls of Bowser-Morner received/placed the samples for processing in the BOWSER-MORNER laboratory/________ (other; specify) on 8-29-86 (date) at 5:00 (time).

BOWSER-MORNER, INC.
Testing Division

BOWSER-MORNER ASSOCIATES, INC.
Engineering Division

Other Locations:
122 S. St. Clair St. • P.O. Box 838 • Toledo, OH 43696 • 419/255-8200
169 E. Reynolds Rd. • P.O. Box 24289 • Lexington, KY 40524 • 606/273-9111

WATER SAMPLING FIELD DATA RECORD SHEET

Technician(s) - Terry Mosoda   Location: ____   Well # #1

Job No. Z8458   ____ Surface ____

Date 8-29-86 Time 11:30 AM

American Steel Foundries

Type Water Pipe: ____ 1 1/4" PVC X 2" PVC ____ 4" PVC ____ Stainless
____ Iron ____ New House ____ Old House ____ Other

Type of Cap: X Guard Pipe ____ Mueller Friction Cap X Padlock ____ Other

Depth to Water 35.0'

Taken from:
Top of Guard Pipe ____
Top of Water Pipe X
Top of Ground ____

Depth of Well: 51.3'

51.3 - 35 = 16.3 → well volume = 2.7 gallons
2.7 × 3 = 8.1

Evacuation Method:
____ Teflon Bailer X PVC Bailer ____ Submersible Pump ____ Pitcher Pump ____ Other

Yes/no Dedicated Equipment

Volume Removed or Time Pumped: 10 Gallons

Field Cleaning Equipment:
____ None X Distilled Water ____ Steam ____ Other, Explain

Sampling:
Temperature: ____ pH ____ Conductivity: ____

Color: ____ Odor: ____

		Iced?
Amount of Unpreserved Sample Collected	1.5 l	X
Amount of H_2SO_4 Preserved Sample Collected		
Amount of HNO_3 Preserved Sample Collected		
Other Preservative		
Coliform - DON'T TOUCH WATER		

Notes: Problem/Discrepancies - use back of page if needed. Sketches are helpful.

BOWSER-MORNER

WATER SAMPLING FIELD DATA RECORD SHEET

Technician(s) Terry Mosada   Location: ____   Well #2

Job No. 28458   ____ Surface ____

Date 8-29-86   Time 10:11 AM

Type Water Pipe: ___ 1 1/4" PVC   X 2" PVC   ___ 4" PVC   ___ Stainless
___ Iron   ___ New House   ___ Old House   ___ Other

Type of Cap: X Guard Pipe   ___ Mueller Friction Cap   X Padlock   ___ Other

Depth to Water 26'10"

Taken from:
Top of Guard Pipe ___
Top of Water Pipe X
Top of Ground ___

Depth of Well: 35.0'

35.0' - 26'10" = 8'2" → 1.3 gallons
1.3 × 3 = 3.9
1.3 × 8 = 10.4

Evacuation Method:
___ Teflon Bailer   X PVC Bailer   ___ Submersible Pump   ___ Pitcher Pump   ___ Other

Yes/no Dedicated Equipment

Volume Removed or Time Pumped: 6 Gallons

Field Cleaning Equipment:
___ None   X Distilled Water   ___ Steam   ___ Other, Explain

Sampling:
Temperature: (or 49°F)   pH ____   Conductivity: ____

Color: ____   Odor: ____

		Iced?
Amount of Unpreserved Sample Collected	1.5 l	X
Amount of H_2SO_4 Preserved Sample Collected		
Amount of HNO_3 Preserved Sample Collected		
Other Preservative		
Coliform - DON'T TOUCH WATER		

Note: Problem/Discrepancies - use back of page if needed. Sketches are helpful.

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WATER SAMPLING FIELD DATA RECORD SHEET

Technician(s) Terry Masada Location: ____ Well #3

Job No. 28458 Surface ____

Date 8-29-86 Time 9:45 AM

Type Water Pipe: ___ 1 1/4" PVC X 2" PVC ___ 4" PVC ___ Stainless
___ Iron ___ New House ___ Old House ___ Other

Type of Cap: X Guard Pipe ___ Mueller Friction Cap X Padlock ___ Other

Depth to Water 18.0'

Taken from:
Top of Guard Pipe ___
Top of Water Pipe X
Top of Ground ___

Depth of Well: 27.0'

Evacuation Method:
___ Teflon Bailer X PVC Bailer ___ Submersible Pump ___ Pitcher Pump ___ Other

Yes/no/Dedicated Equipment

Volume Removed or Time Pumped: 6 Gallons

Field Cleaning Equipment:
___ None X Distilled Water ___ Steam ___ Other, Explain

Sampling:
Temperature: (or 50°F) pH ____ Conductivity: ____

Color: Grey Odor: None

Iced?

Amount of Unpreserved Sample Collected 1.5 l X

Amount of H_2SO_4 Preserved Sample Collected ____

Amount of HNO_3 Preserved Sample Collected ____

Other Preservative ____

Coliform - DON'T TOUCH WATER ____

Notes: Problem/Discrepancies - use back of page if needed. Sketches are helpful.

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WATER SAMPLING FIELD DATA RECORD SHEET

Technician(s) Terry Mosada   Location: ____ Well # 4

Job No. 28458   ____ Surface ____

Date 8-29-86 Time 11:00 AM

Type Water Pipe: ___ 1 1/4" PVC X 2" PVC ___ 4" PVC ___ Stainless
___ Iron ___ New House ___ Old House ___ Other

Type of Cap: X Guard Pipe ___ Mueller Friction Cap X Padlock ___ Other

Taken from:
Top of Guard Pipe ___
Top of Water Pipe X
Top of Ground ___

Depth to Water 10.3'

Depth of Well: 32.0'

32.0 - 10.3 = 21.7 → 1 well volume = 3.5 gallons
3.5 × 3 = 10.5

Evacuation Method:
___ Teflon Bailer Y PVC Bailer ___ Submersible Pump ___ Pitcher Pump ___ Other

Yes/no Dedicated Equipment

Volume Removed or Time Pumped: 12 Gallons

Field Cleaning Equipment:
___ None X Distilled Water ___ Steam ___ Other, Explain

Sampling:
Temperature: 50°F pH ____ Conductivity: ____

Color: ____ Odor: None

		Iced?
Amount of Unpreserved Sample Collected	1.5 l	X
Amount of H_2SO_4 Preserved Sample Collected		
Amount of HNO_3 Preserved Sample Collected		
Other Preservative		
Coliform - DON'T TOUCH WATER		

Notes: Problem/Discrepancies - use back of page if needed. Sketches are helpful.

BOWSER-MORNER

Sept. 18, 1985?

American Steel Foundry
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TEST RESULTS:

Parameter	Well 1	Well 2	Well 3	Well 4
pH	6.1	5.1	6.9	6.9
Conductivity, µmhos/cm	1400	3180	2690	1050
Alkalinity to pH 4.5, mg/l as $CaCO_3$	<1.0	<1.0	360	214
Ammonia-Nitrogen, mg/l	1.1	0.6	1.7	1.1
Total Kjeldahl Nitrogen, mg/l	7.0	16.8	5.3	4.2
Nitrate-Nitrogen, mg/l	<1.0	<1.0	1.0	<1.0
Sulfate, mg/l	749	2320	921	498
Chloride, mg/l	81	51	213	66
Total Dissolved Solids, mg/l	1310	4010	2260	1240
Chemical Oxygen Demand, mg/l	76	99	38	114
MBAS, mg/l	0.1	0.1	<0.1	0.1
Fluoride, mg/l	1.0	<1.0	1.0	<1.0
Phenol, mg/l	0.005	<0.004	0.022	0.019
Cadmium, mg/l	<0.01	0.01	<0.01	<0.01
Calcium, mg/l	190	370	320	220
Magnesium, mg/l	48	170	130	70
Sodium, mg/l	36	19	130	30
Iron, mg/l	52	180	11	14
Chromium, mg/l	<0.01	<0.01	<0.01	<0.01
Lead, mg/l	0.03	0.07	0.04	0.03
Total Organic Carbon, mg/l	48.4	45.1	94.6	36.2

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TOLEDO DISTRICT: 122 S. St. Clair St. • P.O. Box 838 • Toledo, OH 43696 • 419/255-8200

LABORATORY REPORT

Aug. 15, 1985 /

Date: August 26, 1985
Laboratory No.: R 08,523
Authorization:

port to: American Steel Foundry
% BMI Dept. 27
Attn: Mr. Steve Thrasher

port on: Four (4) well water samples for chemical analysis, received August 15, 1985.

SAMPLE IDENTIFICATION:

The samples were identified as Wells 1 through 4.

ANALYTICAL METHODS:

The analyses were performed in accordance with Standard Methods for the Examination of Water and Wastewater, 15th Edition.

TEST RESULTS:

	Well 1	Well 2	Well 3	Well 4
pH	5.6	4.6	6.2	6.4
Conductivity, umhos/cm	800	2300	2280	1170
Total Alkalinity to pH 4.5, mg/l as $CaCO_3$	2	2	420	250
Ammonia Nitrogen, mg/l	1.0	4.0	1.4	1.4
Total Kjeldahl Nitrogen, mg/l	1.7	4.8	2.1	1.7
Nitrate Nitrogen, mg/l	1.3	<1.0	<1.0	<1.0
Sulfate, mg/l	450	2100	1250	560
Chloride, mg/l	21	13	120	35
Total Dissolved Solids, mg/l	730	3340	2660	1120
Chemical Oxygen Demand, mg/l	11.2	59.3	16.3	6.6
Methylene Blue Active Substances, mg/l	0.3	0.1	<0.1	<0.1
Fluoride, mg/l	0.25	1.1	0.40	0.33
Phenol, mg/l	0.030	0.075	0.038	0.020
Cadmium, mg/l	<0.01	0.01	0.01	<0.01
Calcium, mg/l	136	301	350	200
Magnesium, mg/l	50	160	170	55
Sodium, mg/l	53	25	116	35
Iron, mg/l	43	260	16	16
Chromium, mg/l	<0.01	0.05	0.04	0.06
Lead, mg/l	0.10	0.13	0.06	0.06
Total Organic Carbon, mg/l	42.8	721	43.2	13.2

Respectfully Submitted,

BOWSER-MORNER, INC.

James M. Kemper

James M. Kemper, Chemist
Analytical Sciences Division

1-Client
2-File
J. pc

BOWSER-MORNER, INC.

CORPORATE: 420 Davis Ave. • P.O. Box 51 • Dayton, OH 45401 • 513/253-8805
OLEDO DISTRICT: 122 S. St. Clair St. • P.O. Box 838 • Toledo, OH 43696 • 419/255-8200

7/23/85

LABORATORY REPORT

t to: American Steel Foundry
Attn: Mr. Steve Thrasher

Date: July 31, 1985
Laboratory No.: R072440
Authorization:

t on: Four (4) Water Samples from Lake Park Refuge Received for Chemical Analysis July 24, 1985.

MPLE IDENTIFICATION:

The samples were identified as #1, #2, #3, and #4. They were collected ly 23, 1985.

ALYTICAL METHODS:

The analyses were performed in accordance with <u>Standard Methods for the amination of Water and Wastewater,</u> 15th Edition.

ST RESULTS:

	#1	#2	#3	#4
I	5.7	4.9	6.3	6.4
nductivity, μmhos/cm	8720	26,000	26,700	12,600
lkalinity to pH 4.5, mg/l as $CaCO_3$	33	67	492	288
monia Nitrogen, mg/l	<0.5	2.2	0.6	<0.5
otal Kyeldahl Nitrogen, mg/l	0.8	3.4	1.1	0.6
itrate Nitrogen, mg/l	2.5	<1.0	<1.0	<1.0
ulfate, mg/l	410	1850	1280	460
hloride, mg/l	32	32	160	38
otal Dissolved Solids, mg/l	741	3240	2730	1040
hemical Oxygen Demand, mg/l	28	48	12	12
BAS, mg/l	<0.1	<0.1	<0.1	<0.1
luoride, mg/l	0.21	0.66	0.29	0.24
henol, μg/l	43	24	13	9
admium, mg/l	<0.01	0.02	0.01	<0.01
alcium, mg/l	60	260	330	160
agnesium, mg/l	27	140	160	62
odium, mg/l	53	28	110	32
ron, mg/l	16	180	18	12
hromium, mg/l	<0.01	0.01	0.01	<0.01
ead, mg/l	0.02	0.07	0.06	0.03

Respectfully Submitted,
BOWSER-MORNER, INC.

James M. Kemper
James M. Kemper
Chemist
Analytical Sciences Division

MK/n
-Client
-File

Respectfully Submitted,

BOWSER-MORNER, INC.

James M. Kemper

James M. Kemper
Chemist
Analytical Sciences Division

JMK/PKC
1 -Client
2 -File

All samples recovered for this project will be retained at this laboratory for a period of 30 days unless we are informed to the contrary.

BOWSER MORNER